

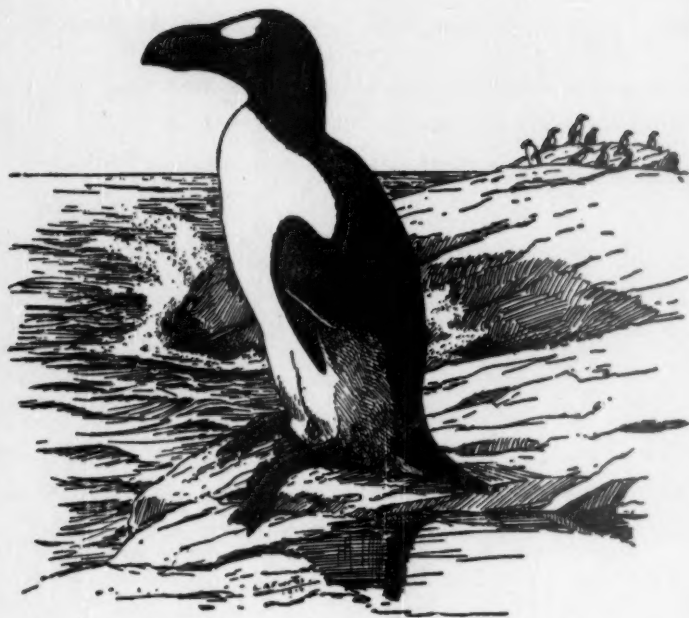
The Auk

A Quarterly Journal of Ornithology

Vol. 67

APRIL, 1950

No. 2



PUBLISHED BY

The American Ornithologists' Union

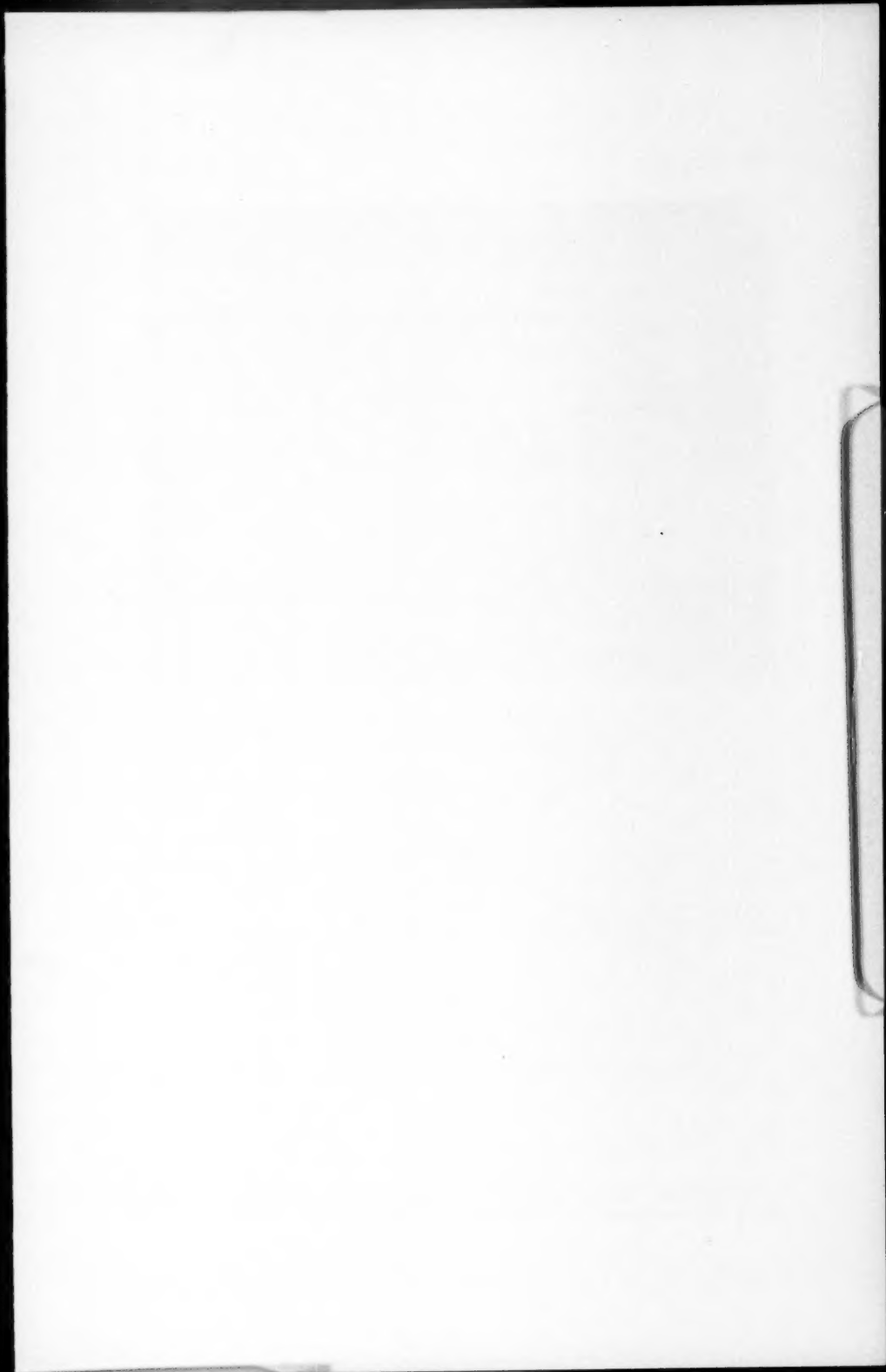
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Printed by The Intelligencer Printing Company
Lancaster, Pa.

Entered as second-class mail matter in the Post Office at Lancaster Pa.,
May 15, 1920, under the Act of August 24, 1912

Accepted for mailing at special rate of postage provided for in the Act of October 3, 1917, embodied
in paragraph (d)-(2) of Section 3440, P. L. and R., of 1948, authorized May 15, 1920.





SCISSOR-TAILED FLYCATCHER. PHOTOS BY ALLAN D. CRUICKSHANK FROM NATIONAL AUDUBON SOCIETY.

THE AUK

A QUARTERLY JOURNAL OF ORNITHOLOGY

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LIFE HISTORY AND ECOLOGY OF THE SCISSOR-TAILED FLYCATCHER, *MUSCIVORA FORFICATA*

BY FRANK WILLIAMS FITCH, JR.

BASIC facts concerning the life history of the Scissor-tailed Flycatcher are available in the literature, but little attention has been given in the past to the sociological and ecological aspects. This paper attempts to bring together and interpret known facts relating to the life history, ecology, and social behavior of the Scissor-tail.

Data were derived from field and library studies conducted between June, 1946, and August, 1947. No field work was done between November, 1946, and March, 1947, when the birds were wintering mainly south of the United States. During that time, questionnaires on the distribution and breeding range were mailed to persons who might be of assistance in the study.

Field work was conducted in Brazos County, Texas, with the exception of one trip to Refugio County, Texas, in June, 1946, and one to Angelina County, Texas, in May, 1947. Study areas, located on the campus of the Agricultural and Mechanical College of Texas, were worked intensively during the breeding season. Field observations of competent local naturalists were utilized in determining the earlier status of this species.

ACKNOWLEDGMENTS

I wish to express my appreciation to Dr. William B. Davis, Department of Wildlife Management, Texas A. and M. College, under whom this study was initiated and completed, for suggestions regarding field work and for guidance during the preparation of the report. Grateful acknowledgment is also due: Dr. Walter P. Taylor, former leader of the Texas Cooperative Wildlife Unit, for assistance in editing the report and for the use of certain equipment; H. B. Parks, curator of the Tracy Herbarium, for identifying plant materials; W. S. Heit, former instructor in the Department of Wildlife Management, for helpful criticism and photographic assistance; and Jack Wood, for assistance in the field. I am indebted to Dr. Herbert Friedmann, United States National Museum, for the loan of specimens.

DISTRIBUTION

This species has been recorded from 28 states in the United States and from at least six of the Central American countries. The breeding range is in south-central United States; the winter range is from southern Texas south to Panama. Migration routes are uncertain, but according to George B. Saunders, Biologist, United States Fish and Wildlife Service (*in litt.*), the general course of their migration in southern Mexico apparently follows the Pacific coastal plain. Those that traverse the Gulf Coast of eastern Mexico evidently cross the Isthmus of Tehuantepec. Accidental records are available from scattered points: *north* to New Brunswick, Maine, and Manitoba; *west* to California; *east* to South Carolina, Georgia, and the Florida Keys.

TABLE 1
DATES OF SPRING ARRIVAL OF SCISSOR-TAILED FLYCATCHERS

Locality	Date	Authority
TEXAS		
Victoria County	March 10	Bent. U. S. Nat. Mus. Bull. 179: 1-555.
Cameron County	March 10	Bent. (<i>op. cit.</i>)
Concho County	March 14	Lloyd. Auk, 4: 181-193.
Refugio County	March 12-14	Carroll. Auk, 17: 337-348.
Bexar County	March 19-21	Attwater. Auk, 9: 229-238.
Harris County	March 23	Bent. (<i>op. cit.</i>)
Kerr County	March 20	Lacey. Auk, 28: 200-219.
Brazos County	March 21-22	Davis, W. B.—personal communication.
OKLAHOMA		
Caddo	April 11	Cooke. Auk, 31: 473-493.
Norman	April 3	Bent. (<i>op. cit.</i>)
KANSAS		
Harper	April 5	Bent. (<i>op. cit.</i>)

Definite breeding records are available from seven southwestern states—Texas, Oklahoma, Arkansas, Kansas, Missouri, New Mexico, and Nebraska. There is a doubtful record from Baca County, Colorado. North-central Texas is the approximate center of the breeding range and there Scissor-tails may be found in abundance from April to October. Dates of spring arrival and fall departure are indicated in Tables 1 and 2.

Post-breeding birds have been taken at widely scattered points in the United States. Following are some of the records of rare or accidental occurrence:

FLORIDA:—As many as 15 Scissor-tails seen together on Key West (Greene, 1944); March 2, 1885, male shot at Cape Sable (Goss, 1886); December 10, 1888, J. W. Atkins saw five near town of Key West, Monroe County and from November 11 to November 28, 1930, he saw one to four birds daily; one taken at Fulford, December 14, 1924 (Howell, 1932). **GEORGIA:**—Tomkins (1934) noted fine plumaged male

taken at Quarantine, June 5, 1933; another reported by Norris (*in* Green, *et al.*, 1945) at Tifton, January 2, 1943. SOUTH CAROLINA:—Sass (1929) observed a Scissor-tail on Edisto Island off the South Carolina coast, November 6, 1928. ALABAMA:—One reported in early spring of 1899 in Autauga County by Golsan and Holt (1914). LOUISIANA:—First record of a specimen for northern Louisiana was at Wisnor, Franklin Parish, April 10, 1933, by P. R. Thaxton (Lowery, 1934); Oberholser (1938) said it is reported to breed (no definite record available) and that it is a rare transient, from March 25 to April 10, and from October 4 to October 6, in southern Louisiana, and a casual summer visitor in southwestern part of state. VIRGINIA:—One specimen near Azlett, King William County, August 31, 1895 (Palmer, 1896); others reported by Ridgway (1907) at Norfolk. MARYLAND:—Palmer (1896) reported a bird near Bryans Point in 1895. NEW JERSEY:—Abbott (1872) reported a specimen shot on Crosswicks Meadows, five miles south of Trenton on April 15, 1871. CONNECTICUT:—Purdie (1877) reported a specimen shot by a Mr. Carpenter, at Wauregan, about April 27, 1876. MASSACHUSETTS:—Female collected at West Springfield, April 29, 1933, by Ludlow Griscom and now in Museum of Boston Society of Natural History (Bagg, 1934). VERMONT:—A Scissor-tail, which "now reposes in Dartmouth College," taken at St. Johnsbury about 1884 (Jencks, 1886). MAINE:—Kuschke (1937) reported a Scissor-tail seen on Matinicus Isle, June, 1936. NEW BRUNSWICK:—One collected May 21, 1906, by G. S. Lacey at Clarendon Station, near Scotch Lake, and given to the U. S. Fish and Wildlife Service (Cooke, 1906); another collected at Grand Manan, October 26, 1924 (Bent, 1942). OHIO:—Male taken near Marietta, May 20, 1894, by Frank H. Welder, skin now in his collection (Jones, 1903). WISCONSIN:—Adult collected at Milton, October 1, 1895 (Bent, 1942). MINNESOTA:—One taken at New London some time prior to 1912, and one seen in Jackson County on June 5, 1930 (Roberts, 1936). MANITOBA:—Seton (1885) reported a specimen shot at York Factory in summer of 1880 and that Scissor-tails were occasionally seen at posts of Hudson's Bay Company all the way west to valley of McKenzie River. COLORADO:—Two females taken in Baca County, near Campo, May 31 and June 1, 1923 (Bailey and Niedrach, 1937). ARIZONA:—One collected at Kayenta, July 8, 1934, and another seen at Sahuaro Lake, on Salt River, Maricopa County, July 12, 1935 (Bent, 1942). CALIFORNIA:—Swarth (1915) recorded one taken June 26, 1915, in northern part of Los Angeles County; one seen near Saugus, Los Angeles County, October 2, 1937 (Philp, 1938) and one seen at La Jolla, San Diego County, November 24, 1933; one noted daily, November 28 to December 5,

TABLE 2

LAST DATES OF FALL DEPARTURE OF SCISSOR-TAILED FLYCATCHERS

Locality	Date	Authority
KANSAS		
Harper	Oct. 24	Bent. U. S. Nat. Mus. Bull. 179: 1-555.
OKLAHOMA		
Norman	Oct. 23	Bent (<i>op. cit.</i>)
TEXAS		
Abilene	Oct. 16	Bent (<i>op. cit.</i>)
Pecos	Nov. 20	Bent (<i>op. cit.</i>)
Concho County	Oct. 20	Lloyd. Auk, 4: 181-193.
Tom Green County	Oct. 20	Lloyd (<i>op. cit.</i>)
Brazos County	Oct. 23	Davis, W. B.—personal communication
Atascosa County	Oct. 27	Bent (<i>op. cit.</i>)

1934, two miles south of Cayucos, San Luis Obispo County (Grinnell and Miller, 1944).

The frequency with which reports have been received from southern Florida may make it necessary to include that area as part of the winter range. The Georgia record for January indicates that the birds may winter in that state also. Irby Davis (*in litt.*) said that an occasional Scissor-tail is seen near Harlingen, Texas, up to the end of December. Both southern Texas and southern Florida seldom experience weather cold enough in the winter to destroy completely the insects which constitute the main source of food for these birds. However, if Scissor-tails do successfully winter in Florida, further data should be obtained on their movements in the spring.

This distributional study brings to light a number of facts that are of significance to all students of ecological zoogeography. First, Scissor-tails are limited to a rather narrow faunal area. Second, this range will expand when climatic and man-made conditions bring about suitable changes in adjacent areas. Bent (1942) set the northern limit of the breeding range as southern Kansas. Today, there are breeding records from northeastern Kansas and southeastern Nebraska. Third, as in so many other species of birds, post-breeding wandering is a factor to be reckoned with and may easily be responsible for extension of the breeding range. Fourth, wintering areas are not definitely geographically delimited and may vary from year to year with food supply and climatic variation. Fifth, there is a dearth of complete information on the winter habitat and range of this species.

BEHAVIOR OF ADULTS

Individuality is strong in the Scissor-tail. No two pairs exhibited the same behavior patterns throughout the breeding season. The location and construction of the nest, care of the young before and after leaving the nest, and defense of the territory vary with different birds. The majority of females would not feed their young while the observer was within the territory but, in one case, one fed young while a car was beneath her nest and photographs were being taken within eight feet. Another case of unusual individual behavior was exemplified by the female that built her nest on the cross-arm of a telephone pole. A nest was placed in the same location for two years, suggesting perhaps that either the same bird or one of the brood reared in that nest may have returned by choice to this unusual location. One male accompanied his mate on most of her missions while she was building the nest, but the majority of them sat on some nearby perch and watched the female.

Some females chose noisy locations for their nests, others preferred the open field or pasture. Nest construction was generally uniform, but all Scissor-tails did not use the same materials. Plant materials were preferred by the majority, but one female used 71.5 feet of string in 49 different pieces and four strips of cloth totaling 35 inches in length, although the more commonly used materials were available.

Despite the marked individuality, there are certain inherent characteristics that manifest themselves in all birds of this species. One of the strongest is pugnacity. Nestlings of eight to ten days of age showed concern at being removed from the nest and made attempts to peck the hand of the observer. Each day thereafter some or all of the brood exhibited a fighting attitude. Adults show belligerency in various ways. Intraspecific strife in defense of territory is common in this species. Even before territories are established and courtship is just beginning, the species displays a strong and sometimes violent intraspecific antagonism. Mr. V. M. Miller, College Station, Texas, gave the following eye-witness account of two Scissor-tails that fought until both were dead. "The two birds were first noticed fighting in the air and as I drove up near them they fell to the ground, still locked in combat. I stopped my car and watched as they fought, first off, then on the ground. Finally after almost ten minutes, one bird got the other on its back, stood on its breast and alternately pecked and pulled at the throat. This action put an end to the one on the ground, but apparently the exertion was fatal to the winner, because he backed off a few feet and died." The birds were not sexed. Whether this was a territorial duel or the result of attempts to win the same female is not known, but it is an example of the extremes to which the pugnacity of the Scissor-tail can be carried. Belligerence is shown toward all birds of prey. Even other passerines are frequently driven from the nest tree, depending on the nearness to the nest and the tolerance of the individual Scissor-tail.

To test the reaction of a pair of nesting Scissor-tails a mounted Barred Owl, *Strix varia*, was placed in the nest-tree. In five minutes, the dummy was discovered and the resident birds, plus a third Scissor-tail, scolded and flew "nervously" about it. After 10 minutes, the owl was placed on the ground and in the open. More than 100 birds were attracted to the area, including Mockingbirds, English Sparrows, Bronzed Grackles, and three Scissor-tails. Attacks by the Scissor-tails were frequent, and their dives came closest to the owl.

Antagonism toward human beings is equally strong. Most nesting pairs left the nest-tree before I had approached within 50 yards and, instead of flying away without protest, flew toward and over me.

This behavior was accompanied by vocal protestations. If the nest-tree were climbed, both birds hovered close overhead and in some cases dived at my head. Stories of attacks on dogs and cats have been obtained from reliable sources.

The males perform in various ways. According to Mrs. Bailey (1917), one favorite performance is to fly up and, with rattling wings and penetrating bee-bird screams, execute an aerial seesaw, a line of sharp-angled 'VVVVVVV's, and at the angles rapidly opening and shutting the long white scissor-blades. This is the nuptial flight, performed during mating activities and occasionally thereafter.

Roosting is the daily expression of gregariousness; the migration flock may be the annual expression of the same instinct. In appearance, they are the same. At the roost, another behavior is displayed which will here be called "play." Just prior to dark, many of the birds indulge in aerial games of tag, chasing each other over and around the roost tree. This frequently ends in a brief fight with no harm to either participant. This is possibly an exhibition of pugnacity, but differs in intensity from that displayed during courtship and territorial defense.

Excitability is an easily recognized trait. Birds disturbed from the roost tree just before or during darkness show an irritability approaching "hysteria." They dash in all directions from the tree, much as a covey of quail bursts from the ground, to the accompaniment of rattling wings and screaming voices. Bent (1942) reported from Mrs. Bailey as follows: "At sundown when Mr. Bailey shot a rattlesnake at the foot of a big oak in camp the report was followed by a roar and rattle in the top of the tree and a great flock of scissor-tails arose and dispersed in the darkness."

Adult Scissor-tails exhibit a highly developed parental instinct. Not once was a brood allowed to starve, in spite of continued handling of the young and interference by man. One female reared a brood of three in spite of the death of the male. After the young birds leave the nest, the parents remain with them until they are able to fly long distances. The young are escorted to the roost at night and are followed by the parents during the day as they wander over the countryside. Family groups were observed in late August, and there is some evidence that these units remain intact through migration, as the migrating flock is not one large group, but is composed of smaller sub-groups. Harold L. Blakey (*in litt.*) on October 12, 1946, counted 39 Scissor-tails along the highway between Austwell and Victoria, Texas, a distance of 45 miles. These were in groups of 1, 3, 5, 6, 8, and 16 birds. Dickey and Van Rossem (1938) said that at Divisa-

dero, El Salvador, on October 23, 1925, a "good sized flight of several scores was noted flying southeastward by singles and couples at sunset. . . ." These observations suggest that this species is one that moves from summer to winter quarters and back in family groups, in contrast to the behavior of starlings, grackles, cowbirds, and other well known flocking species.

Further evidence of the strong parental instinct is given by the following observations. On August 21, 1946, three family groups were observed drinking and bathing in a tank located about a mile south of College Station, Texas. Both parents were with two of the three broods, only the female was with the third. All birds perched on a nearby wire and by ones and twos dived to water level, scooped the surface briefly and flew back, much like swallows. Young birds waited for the parent to lead the way and were slightly more awkward in recovery after touching the surface of the water.

Essentially a perching bird, the Scissor-tail may be first seen sitting quietly on tall prairie plants or limbs of dead trees. Frequently a telephone wire, a power line or more commonly the topmost strand of a barbed-wire fence is the chosen perch. From this vantage point, the bird darts at flying insects, sometimes straight up, sometimes 50 to 100 feet away, always displaying remarkable maneuverability. The long rectrices act as brakes and, with the assistance of rapidly beating wings, the birds may hover over one spot or make abrupt right-angle turns. When frightened from its perch, the Scissor-tail may fold its tail and, with rapid wing beats, fly swiftly to a new location. Occasionally it alights on the ground, making short forays for grasshoppers, but this behavior is awkward in tall grass because of the long tail which then is a hindrance.

TERRITORIALITY

One of the strongest behavior patterns exhibited by this species is the tendency to pick a certain restricted area for breeding purposes and to defend it against encroachment of other members of the same species. It is a mechanism that provides for a spacing of breeding pairs and obviously restricts the number of birds that can utilize a given area. Most of the competition is intraspecific, in support of which it can be stated that not once during the course of the study were two nests of this species found closer together than 76 yards. In at least six instances, however, nests of other species of birds were found in the same tree. Three of these belonged to Mockingbirds, *Mimus polyglottos*, also a strongly territorial species. Other species involved were: the Mourning Dove, *Zenaidura macroura*; Orchard

Oriole, *Icterus spurius*; and English Sparrow, *Passer domesticus*. The most unusual example to come to the author's attention was that of Scissor-tails and Red-tailed Hawks, *Buteo jamaicensis*, nesting in a large live-oak in the Divide Country west of Kerrville, Texas (Taylor, 1946). The hawks' nest was on the west side of the tree, the Scissor-tails' on the east. This is contrary to their usual behavior. Raptors usually are greeted with attacks as vigorous as the flycatchers can muster. Not only do the breeding birds of the immediate area conduct themselves in this manner, but they also are reinforced by all birds within hearing distance. On May 21, 1947, I watched seven Scissor-tails harrass a Red-tailed Hawk for 20 minutes as it circled high over the area. It seemed that all territorialism was temporarily forgotten to ward off a threat to the common welfare. After successful completion of their mission, the Scissor-tails fluttered down to treetop level and shortly were fighting among themselves to reestablish the sanctity of their individual territories.

On arrival in their breeding range at College Station in the latter part of March, the birds are in small flocks and spend the nights in a common roost tree. For four to six weeks the countryside into which they disperse during the day is common domain, but after mating is accomplished the males begin active defense of nesting sites chosen by the females. During nest construction and brooding, the male leads the most active defense as the female seldom leaves the nest, but after the young birds hatch the female frequently joins her mate in expelling any intruders that venture too closely.

Territory in bird life as first conceived, pertained entirely to intra-specific competition, but territorialism in the Scissor-tail includes the above discussed belligerency toward predators. Davis (1941) found that Kingbirds indulged in this interspecific behavior, and classified it as a type of fighting which was associated with the psychology of territoriality. He states that belligerency is a widespread characteristic of this group of flycatchers (Tyranninae). During the work with nestlings, I was repeatedly threatened by parent birds, which fluttered overhead and scolded continuously, or actually made determined dives to within a few feet of me. Often, the parents attracted other Scissor-tails to the area by their cries, and for a few minutes the parents would permit the intruding birds' presence, but very soon they would drive them away. If the pursuer happened to pass into the territory of the pursued, the rôles were reversed and the conflict continued until each bird had returned to its own territory. In study area III, two miles west of College Station, three breeding pairs occupied an area of 22 acres, and the nest locations formed a rough triangle.

Territories in this case included the ground within a radius of 35 yards from the base of the nest-tree. When one pair was disturbed, the two other males usually joined them and this resulted in heated aerial dog-fights until each bird had returned to his own home ground. This was the only place where the size of the territory could be measured with any degree of accuracy.

A population census was taken to determine the density of breeding birds. This was accomplished by examining each potential nest site on the basis of its utility to breeding birds on three study areas selected near College Station. Area I was a permanent pasture of 45 acres. It was 74 per cent covered with mixed pasture grasses, bisected by an intermittent stream which was bordered by mixed hardwoods, and contained 19 trees suitable for nesting, that is, isolated trees or clumps of trees, three of which were in use. Two of them, all postoaks, were 100 yards apart, while the third was 300 yards from the other two. There was occasional intraspecific territorial fighting, but this occurred for the most part when one pair, unduly excited by my presence, aroused the neighboring pair by its loud staccato calls. In this area, there were approximately 15 acres per breeding pair. Area II, likewise a permanent pasture, contained 62 acres, 80 per cent of which were covered with pasture grasses. It was bisected by the same stream as that in Area I. It contained scattered broadleaved trees or small groups of trees, 34 of which were judged to be suitable potential nesting sites. A survey of the breeding population showed four of them were occupied. No two nests were closer together than 100 yards. On this plot there were 15.5 acres per breeding pair. Area III contained 22 acres. During the two-year period of this study it was under cultivation during the growing season. Six suitable nesting sites were present, three of which were occupied in 1946, two in 1947. The two closest nests were 76 yards apart and, during the 1946 season, friction between two of the pairs was continuous. As mentioned above, the third pair occasionally joined in the fighting. In 1947, only two pairs occupied the same area. Almost no territorial fighting took place then as the nests were approximately 100 yards apart.

From these observations, it can be stated that the Scissor-tails' territory may comprise an area of 30 to 40 yards on all sides of the nest location, which is vigorously defended against other members of the same species. As a rule, other species are allowed to enter or to pass through the territory unmolested, except those recognized as predators. To one pair, the Blue Jay, *Cyanocitta cristata*, was a recognized predator. On July 2, 1947, while watching the activities of a pair of birds feeding three young, three successful attacks on a young Blue Jay

were made. Not only was he driven from the nest-tree, but also from adjacent trees. The limits of intolerance of the jay included an area at least 50 yards in radius from the nest-tree. Mourning Doves were allowed to perch on a telephone wire near by, but at least one dove was expelled from the nest-tree by both male and female Scissor-tails. A Lark Sparrow, *Chondestes grammacus*, that perched within three feet of the nest was attacked by the female. These data indicate that an area of complete intolerance to all species immediately surrounds the nest, with gradations of intolerance outside of that, their extent depending on the species involved.

NIDIFICATION

The first nesting was observed on June 6, 1946. The nest was 20 feet from the ground in a 25-foot post oak. At 9:00 a. m. the female entered the tree with nesting material. The framework of coarse stems of weeds and twigs, intertwined with pieces of cloth and paper, was just begun. Both male and female took part in the flights for materials, but only the female carried materials. The male escorted the female to the nest and sat on a fence near by until she had completed the arrangement of the new material. When she left the nest, he followed at least part of the way. Occasionally he accompanied her to the source of material, but more frequently he flew only a short distance and waited for her return. The female was flying more than 200 yards to obtain materials and returning to the same area each time. On one return trip a new male joined the pair, but he was immediately attacked by the first male.

The contours of the nest were shaped by the female, using not only her bill but also her feet in a scratching or pushing motion.

On June 8, the female was still adding material, although the nest was practically finished. This material was smaller in size and was added to the interior of the nest. On June 11, no nesting activity was observed, and there were no eggs in the completed nest. On the morning of June 12 there still were no eggs, but on the afternoon of the 13th there were two eggs.

On June 26, 1947, another nest-building operation was watched between 8:15 and 9:15 a. m. The framework was well started, indicating that the first work had been done at least the day before. The female was doing all the work. She spent as much as five minutes in the nest between trips, turning with her body to shape the interior, and using her feet and bill to push and pull the material into shape. She did not take time to feed while on a material-gathering mission but went straight to a limited area and returned directly to the nest.

There was no attempt to conceal the position of the nest or her activities. The male was absent until 8:40 when he arrived and sat quietly on a barbed wire fence 50 yards away. At 8:50 he left and attacked a Turkey Vulture, *Cathartes aura*, that was flying approximately 150 yards from the nest. The pursuit was carried on for about a quarter of a mile, and the vulture was driven from the area. At 9:05, the male returned to the nest-tree, flew up and greeted the female with a twittering "salutation," and inspected the nest. The female left again while the male sat quietly on a nearby limb. This time the female was gone for eight minutes, a period longer than usual. Twenty-one trips were made with nesting material in this one-hour period, all by the female. The male took no part in nest construction but guarded the nest in her absence and defended the territory against intruders.

Most construction is accomplished between 8:00 and 10:00 a. m. Activity is less during the hotter parts of the day, and practically ceases in the afternoon. This may account for the fact that nest construction requires from two to four days. In 1947, the earliest record for nesting activity was May 21 and in 1946 it was June 6. The latest nesting activity in 1946 was recorded on June 29 and in 1947, on July 5.

THE NEST

Location.—The wide range of nest sites observed during the study made it difficult to determine any preference regarding height from the ground or distance from the trunk of the tree. However, most of the nests were placed in isolated trees or isolated groups of two or three trees, that is, trees that stood alone in the middle of a pasture were preferred to those growing in numbers at the edge of the forest or along a stream. None was found along streams where the vegetation was concentrated or in the post oak woods of the uplands. Almost any species of tree that grew apart from the woods proved acceptable. The prairie, with its scattered scrub post oak and mesquite, is the preferred vegetation of the Scissor-tails in Brazos County. In Harris County, Texas, Nehrling (1882) found the birds nesting frequently in the "bosquets" on the prairies, in the borders of woods, in isolated trees in the fields, and even in gardens. In that part of Texas, the nests are in most cases placed in trees densely covered with *Tillandsia* and are difficult to discover. Bendire (1895) wrote that they prefer mesquite trees, less frequently live-oaks and post oaks, thorny hackberry or granjeno (*Celtis pallida*), huisache (*Acacia farnesiana*), honey locust (*Gleditsia triacanthos*), mulberry (*Morus* sp.), pecan (*Hicoria pecan*), and the magnolia (*Magnolia grandiflora*).

Observations made on 32 nests during the course of the study are summarized in Table 3. Two were located in scrub live-oak trees scattered in the spartina flats near the edge of St. Charles Bay on Aransas National Wildlife Refuge, Aransas County; the remainder were in Brazos County.

Description and Materials.—To determine the preferred nesting materials of Scissor-tails in Brazos County, Texas, 10 nests were analyzed. Mr. H. B. Parks, curator of the College Herbarium, assisted in identification of the plants.

The outside diameters at the rim of the nest averaged 120 mm. and the inside diameters at the rim, 82 mm. The average height was 58 mm.; the average inside depth of the cup was 42 mm. The nests

TABLE 3
LOCATION IN TREES OF NESTS OF SCISSOR-TAILED FLYCATCHERS IN TEXAS

Location	Height from ground	Distance from trunk
Water oak, <i>Quercus nigra</i>	15 ft. 3 in.	Main stem
	9 ft. 3 in.	3 ft. 3 in.
Cottonwood, <i>Populus deltoides</i>	17 ft.	Main stem
Live oak, <i>Quercus virginiana</i>	13 ft. 3 in.	4 ft.
	8 ft.	Main stem
	7 ft.	1 ft.
Retana, <i>Parkinsonia aculeata</i>	9 ft. 8 in.	4 ft. 6 in.
Mesquite, <i>Prosopis glandulosa</i>	13 ft.	Main stem
Elm, <i>Ulmus pumila</i>	9 ft. 10 in.	2 ft. 3 in.
	11 ft. 2 in.	2 ft.
Pecan, <i>Hicoria pecan</i>	8 ft. 10 in.	3 ft. 10 in.
	14 ft. 6 in.	11 ft.
	11 ft.	2 ft.
Hackberry, <i>Celtis mississippiensis</i>	17 ft. 4 in.	8 ft.
	15 ft. 7 in.	7 ft. 10 in.
Yaupon, <i>Ilex vomitoria</i>	8 ft. 10 in.	5 ft.
Pear, <i>Pyrus communis</i>	14 ft.	3 ft. 6 in.
Telephone pole	26 ft. 10 in.	2 ft.
	26 ft. 10 in.	2 ft.
Postoak, <i>Quercus stellata</i>	16 ft. 6 in. (ave.)	5 ft. 8 in. (ave.)
	7 ft. (min.)	2 ft. (min.)
	21 ft. 7 in. (max.)	16 ft. (max.)

averaged 31 grams in weight. The framework and exterior were rough, and plant stems or pieces of string were frequently left hanging. From outside to inside, the construction of the nest becomes more compact and materials used are smaller and finer in quality. Nests were sometimes poorly attached to the limbs on which they rested; two were found on the ground beneath the nest-tree six weeks after being used.

Miscellaneous plant parts composed 95 to 100 per cent of the bulk of most nests; animal matter consisted of traces of locally abundant materials (wool, feathers, hairs) which served the same purposes as the

more commonly used plant parts. For purposes of description, the nest was divided into three parts: (1) the framework; (2) the cup; and (3) the lining. The framework consisted of coarse materials, plant stems and inflorescences, and the stolons of Bermuda grass, *Cynodon dactylon*. Into this were woven the pieces of string, thread, cloth, and cotton which were found in all parts of the nest. The most commonly used plant for the framework was cudweed, *Gnaphalium spatulatum*. One bird used post oak catkins and sheep wool. Another used tissue paper and spanish moss, *Tillandsia usneoides*, but all included cudweed. One contained as much peppergrass, *Lepidium* sp., as cudweed.

The cup was more closely knit than the framework, and the materials employed were usually smaller in size. Here, for instance, was found a layer of inflorescence of *Gnaphalium*, rather than the whole plant as was the case in the framework. String, cloth strips, and cotton were commonly used, and the cup of one nest was strengthened by the use of soil. Evidently a sandy loam had been added in a wet condition and used somewhat as the Robin and Wood Thrush use mud, although the layer was very thin and did not extend throughout. One female used four caterpillar cocoons which served to strengthen the nest by binding the framework more closely to the cup. Less commonly used were sheep wool, Bermuda grass leaves, strips of bark of shredded cedar, *Juniperus virginiana*, chicken feathers, post oak catkins, leaves of cudweed, and thistle down.

A variety of materials was used in the lining, but the most common was dried roots. The pappus of the thistle, *Cirsium virginianum*, was used in half of the nests examined. One nest was completely lined with this material. Cotton fibers lined one nest, and the woolly leaves of *Gnaphalium* partially lined another.

Although a variety of materials may be used in different nests, certain plants are characteristic of nests of Scissor-tails in Brazos County. The framework usually contains the complete stalks of cudweed in varying amounts. The cup contains the dried inflorescences of this same plant in some quantity, and the lining is characterized by the presence of small dried plant roots and the pappus of various thistles.

THE EGGS

The eggs, three to five in number, rarely six (Reed, 1904) are laid, one each day, in May, June, and the first two weeks in July. Of 16 clutches observed in Brazos County, six were of three eggs, four of five eggs, and six of four eggs. According to Davie (1898), Singly said that in Lee County, Texas, the usual number of eggs in a set is

five, fully 80 per cent of the sets having this number. The average incubation period in three clutches observed by me was 14 days. Bendire (1895) stated that incubation lasts about 12 days.

The ground color is white or creamy white, marked with a few dark red spots, occasionally pale purple, chiefly at the larger end; the eggs vary in color from pure white, unmarked specimens which are rare, to those finely speckled with reddish-brown and often covered with large spots and blotches of brown and lilac. They resemble the eggs of the Eastern Kingbird, *Tyrannus tyrannus*, but average smaller and their size is more constant.

Of those eggs under observation, 80 per cent hatched. Never was a full clutch lost because of failure to hatch, but two-thirds were lost in one clutch and one-half in two others. Eggs that failed to hatch were removed from the nests by the adult birds three to four days after the first egg had hatched.

The Scissor-tail showed no inclination to desert the eggs after being driven from the nest. Repeated handling of the eggs did not prevent hatching or the continued brooding activity of the female bird.

Only one case of social parasitism occurred. One nest, discovered after desertion, contained three Scissor-tail eggs and four of the Cowbird, *Molothrus ater*.

There was no indication of a second brood being reared, although Bendire (*op. cit.*) stated that it is probable that two broods are raised in many instances in the southern portions of their breeding range.

GROWTH OF THE YOUNG

Eleven different measurements were made at 24-hour intervals from July 7 to 20, 1947, on a brood of three nestlings to determine growth rates. The first measurements were made on one chick (No. 103466) immediately after hatching. The first measurements on the other two were made 24 hours later, when No. 103468 was slightly more than 24 hours old and No. 103467 was slightly less than 24 hours old. The feet of the three birds were stained with gentian violet for purposes of recognition. Bands could not be secured to the legs until the birds were four days old. At that age, United States Fish and Wildlife Service bands, bearing the above-mentioned numbers, were attached to the tarsi.

Methods for making the measurements follow those outlined by Baldwin, Oberholser and Worley (1931). The scales were placed in a pasteboard box 14 inches deep, while being used in the field, to reduce wind currents and make the measurements more accurate.

Nestlings were removed from the nest each day for approximately

one hour while measurements were made. After they reached 10 days of age, the young showed fear, and this in addition to advanced feather growth made measurements difficult. On the 14th day, the young were capable of flight, and on the 15th day all birds were out of the nest, making measurements impossible.

The measurements showed that the width of the head at the eyes and parietals, and length of body were the most conservative measurements, increasing less than 100 per cent during the first 14 days. The least conservative measurements were: (1) total weight, which increased over 1,000 per cent; (2) extent of wing (400 per cent increase); (3) length of head (343 per cent increase); (4) length of bill (300 per cent increase); (5) length of middle toe (288 per cent increase); and (6) length of tarsus (278 per cent increase).

The similarity of the growth rates of the three nestlings indicates that each received about the same amount of food daily. In four other broods observed, there were no "runts" or individuals that were not able to keep pace with other members of the brood.

CARE OF THE YOUNG

On July 2, 1947, I spent a continuous 13-hour period watching the activities of a pair of birds with four young in the nest. Observations began at 6:00 a. m. and continued through 7:00 p. m. During this time, 92 trips were made to the nest by both parents, 23 by the male and 69 by the female. There was an average of 7.0 trips per hour, no feeding activity from 6 a. m. till 8 a. m., and a maximum number of trips per hour (14) between 4 and 5 p. m. Fecal sacs were removed from the nest 12 times during the day, four times by the male, eight by the female. Between 6:00 a. m. and 8:00 a. m. the adults were wary about feeding the young, hovering near the nest and then flying away. Both sat on a near by fence, feeding and preening. At 8:10, the female fed the young for the first time, followed almost immediately by the male. Only five trips were made between 8:00 and 9:00. Between 9:00 and 10:00 the young were fed 13 times. The female collected most of the food, largely grasshoppers and small moths, in a nearby pasture. She frequently crushed the insects with her mandibles before presenting them to the young. The male occasionally flew to a telephone line holding the insect in his bill and beat or rubbed it against the wire. Between 10:00 a. m. and 3:00 p. m., the adult birds slowed their activities, possibly because of the heat. They sat with bills open, panting noticeably. Between 10:35 and 11:00, the female sat on the edge of the nest with wings drooping, apparently in an effort to shade the young. At 12:40, both male and female attacked

and expelled a dove from the nest tree. At 1:15, the female assaulted a Lark Sparrow which ventured within a few feet of the nest. The young were fed only five times between 1:00 and 2:00 p. m. Between 2:00 and 3:00 p. m. four feeding trips were made by the female, one by the male. Both birds were absent 15 minutes, having joined other Scissor-tails of the area in attacking a Crow. Between 3:00 and 4:00 p. m. there was a noticeable increase in feeding activity and during the next hour reached its peak. Once between 3:30 and 4:00 p. m. the sun fell directly on the nest, and the female stood on the rim between the young and the sun. From 5:00 to 7:00 p. m., the young were fed 22 times, 11 feedings each hour.

On July 8, 1947, another nest was observed during feeding activity. Between 9:45 and 10:45 a. m., seven trips were made to the nest by the female, one by the male. On July 11, the same nest, with three young, was observed between 10:20 and 11:20 a. m. During this time the female made five trips to the nest, the male two. On July 16, detailed observations were made at the same nest with the aid of binoculars. Between 1:30 and 2:30 p. m., the young were fed three times by the female. She spent most of the hour shading the young, as the heat was intense. One feeding was closely observed. She perched on a wire for a brief period, flew out and down to capture a flying grasshopper and then back to the wire. Here she mashed the insect with her bill, beat it against the wire, shook it from side to side, dropped it temporarily, retrieved it, and continued the process of crushing. After three minutes of such preparation, she flew to the nest and fed the insect to one nestling by inserting her bill and the contents into the gaping mouth of her offspring. After this feeding she again placed her body, with wings drooping, between the young birds and the direct sun. While in this position her bill was constantly open and panting was noticeable.

On July 17, feeding activities were watched between 9:00 and 10:00 a. m. During this hour, the female made six trips to the nest, the male one. One other trip was made by the male, but instead of feeding to the young the grasshopper which he held in his bill, he ate it himself. A fecal sac was removed by the female at 9:45.

Care of nestlings after daylight hours is the sole responsibility of the female. When young birds were in the nest, all nests visited after dark contained the female. The male was never located at the nest at night, and apparently he shares none of the responsibility. In one case, the female was flushed by use of a spotlight. She flew 50 yards away, sat on a fence post, and scolded the intruder. She did not return as long as the observer was near.

Nestlings are not protected from rain by the parents. This statement is true for the brief, light to moderate precipitations which characterize the summer months in south-central Texas. No observations were made during a prolonged or intense rain.

These observations allow the following conclusions: (1) the female is more attentive to the young than the male; in 18 hours of feeding activity, the female fed 91 times, the male 30; (2) food consumed by young Scissor-tails is for the most part flying insects—grasshoppers in various stages of development, small moths, and occasionally hymenopterous insects; these are usually broken and crushed by the parents before being presented to the young; (3) usually, the food is gathered from within a 200-yard radius of the nest-tree; (4) the height of feeding activity is between 4:00 and 6:00 p. m., and no feeding takes place in the first hour of daylight; (5) during the middle of the day, the female spends more time shading the young from the direct sunlight than she does in feeding them.

FEEDING HABITS

Scissor-tails take their food mainly in the air. The usual method of feeding is one diagnostic field character. The birds perch in wait for their prey on some prominent outpost, many times with wings vibrating and tail drooping in readiness for instant action. On the approach of a suitable insect they launch into the air, seize it with a quick movement and click of the beak, and return to their stand. When on the ground, the method may be similar, but the dash usually is shorter. Doubtless some insects are picked off the ground.

Beal (1912) stated that in 128 stomachs examined, 96.1 per cent of the contents was animal food, practically all insects and spiders and that 3.9 per cent was vegetable matter, chiefly small fruits and seeds. Of the animal food, less than one per cent belonged to useful families of insects, the rest being practically all harmful. Grasshoppers and crickets averaged 46.1 per cent.

Nehrling (1882) said that in September, after the breeding season, the Scissor-tails gather in large flocks, visit the cotton fields where multitudes of cotton worms, *Aletia argillacea*, and their moths abound, and with other small birds eagerly feed on these insects.

In August, 1946, the writer examined three stomachs. One, a juvenile male, contained grasshoppers exclusively. Another, an adult male, contained mostly grasshoppers, three blue bottle flies (*Calliphoridae*), a carpenter bee (*Andrenidae*), and unidentifiable ichneumonids, parts of one coleopteran, and one hard, thick-coated seed. The third, from a juvenile female, contained grasshopper remains

exclusively. Two birds, found dead on the highway, were examined in June, 1947. One stomach was empty, but the other contained two recently caught grasshoppers.

ECTOPARASITES

A dozen, freshly killed birds were combed in August, 1946, but no parasites were found. One brood of five had a light infestation of mites, *Liponyssus bursa* (identified by Dr. R. W. Strandtmann, University of Texas Medical College) at five days of age, and at eight days all members of the brood were heavily infested. The bill and face, as well as all body surfaces, were affected. No ill effects were observed; all birds remained in the nest and developed normally. Lighter infestations of the same mite were found in three other broods. Nests collected three days to a week after departure of the young were heavily infested with this mite.

SONGS AND CALLS

Despite its lack of efficient vocal equipment, the Scissor-tail gives forth various harsh and unmusical phrases. These cannot be construed as songs in the usual sense, but for lack of a more descriptive word, have been thus described by various authors. Here, "songs" are understood to be polysyllabic phrases to differentiate them from the more or less monosyllabic call notes.

Twilight song.—Mrs. Nice (1931) said, "on June 2, 1929, near Cashion, Oklahoma, I had the privilege of hearing the 'twilight song' of a Scissortail Flycatcher nesting next the house in which I was staying. At 5:01 a. m. this bird began to shout *pup-pup-pup-pup-pup-pup-pup-perleep* 16 times a minute for about four minutes. Then for three minutes nothing was heard but a few *pups*. At 5:07 he began again with a new note—*pup-pup-pup-peroo*, lower and less loud than the first phrase, the number of *pups* varying from none to three, the most common being two. A minute later he started to fly about, but kept up a continuous chatter of *pup-peroo* till 5:12.

"He and his mate then flew away, but were back at the nest at 5:18 with loud *pups*. At 5:27 just as the sun was rising over the prairie, the female sat on the barbed wire fence with wings held straight out from her body and her tail spread to its furthest extent. Later the male assumed this same attitude, at the same time saying *peelyer per*. At 5:42 he retired to the nest and gave a last *pup-pup-peroo*. The *pup-pup-pup-pup-pup-perleep* was about one second long; intervals between beginnings of phrases varied from 3.5 to 4 seconds. The *pups* were uttered rapidly, giving the effect of a stutter; the emphasis was on the *perleep*."

The twilight song is uttered during the closing hours of the day, as well as in the morning. In early July, 1947, on the Texas A. and M. campus, roosting birds were heard giving a call which agrees with that described by Mrs. Nice. In this case, only the males were singing. The 'pups' or 'tuks' came in threes, all of the same value and evenly spaced. The climax follows close on the third 'tuk' and builds rapidly up the scale to a screech, sounding like 'terreet.'

Flight song.—Mrs. Bailey (1917) said that one of its favorite performances is to fly up and, with rattling wings and penetrating bee-bird screams 'ka-quee-ka-quee-ka-quee-ka-quee' execute an aerial seesaw, a line of sharp-angled V's, at the angles rapidly opening and shutting its long white scissor-blades. Similar performances may be seen during the breeding season as part of the sexual display. The above hardly describes the song adequately. It might better be regarded as similar to the twilight song, but uttered in a faster tempo and representing the "height of nervous excitement." The song matches the flight in intensity, that is, the bird utters the single, staccato notes during level flight, and as the abrupt, vertical dash builds upward in altitude the vocal accompaniment ascends the musical scale, giving the impression that one stimulates and accompanies the other. The same action has been noticed when the birds are going to, or returning from, an attack on a hawk and, therefore, may be the result of excitement.

Alarm note.—Usually when perched on a wire or twig, the Scissor-tail is quiet. When disturbed by the presence of a stranger, or interrupted during nesting, both male and female voice their disapproval by using a single-syllabled 'tuk' or 'pup'. This is repeated as long as the disturbing element remains in the area. It is used by parents when communicating with nestlings. When one week old, the young recognize the call. At 10 to 12 days, they give the same note, almost as strongly as the adult, and this usually brings a similar response from the parents.

Salutation or recognition call.—The male frequently guards the nest in the absence of the female and as she returns he flies out to meet her. As the two approach each other, a stuttering series of staccato, single notes and phrases are emitted. These are harsh sounding and are accompanied by fluttering wings and a widely-fanned tail. While she feeds, the male flies to some nearby perch and, after she has finished, she joins him. Again, both flutter their wings and hover briefly, much as a Sparrow Hawk does when it prepares to dive to the ground for a grasshopper. In almost all instances, this call is given when the two adults meet and is presumed to be some form of greeting. It lacks the intensity of excitement and volume shown in the flight song. It might be described as a twittering series of monosyllabic monotones.

Call of nestlings.—Nestlings are able to squeak at hatching. These faint sounds cannot be heard more than 3.5 feet away and are uttered when the nest is shaken. At five to six days of age, nestlings use a 'churr' note which is similar to that of nestling birds in general. This churring is a begging note and, at the same time it is given, the nestling sticks its head up and opens its mouth in apparent expectation of a meal.

FLOCKING

During the fall the species is gregarious, banding into flocks of considerable size before and during migration. This behavior continues through the winter and the spring migration to the breeding grounds. In the spring the birds arrive in flocks and spend the nights in a common roost tree. At 6:30 p. m. on March 23, 1947, at College Station, 12 Scissor-tails were seen in a large hackberry tree that was still bare of leaves. They were grouped together, feeding and calling. At 6:45 p. m. they flew down to an evergreen privet and settled for the evening. Shortly, they were flushed from the bush, and re congregated in a live-oak after a few minutes of flying around nervously and calling excitedly. Here they spent the night. This was the first flock seen by the writer in 1947 and evidently was the first migratory flock to arrive in the vicinity. For the next month, similar behavior was observed in the evenings. During this time, only an occasional Scissor-tail was seen during the day in the tree or on the campus. However, the size of the roosting flock increased. On April 23, the hackberry tree, in which the flock was first seen, was completely leafed out and was still being used as the roost. Pairing had begun, but as yet the territories either had not been selected or were not being defended. At 6:30 p. m. that day, after sundown, a few birds were present in the vicinity. At 6:35 p. m., birds were arriving steadily. Congestion was acute on the outer branches of the tree, causing much commotion. Some of the perched birds fluttered their wings to maintain balance; others left one perch to find a more suitable one. This maneuvering was accompanied by much fussing and squawking. Some of the birds that had not flown to the roost were uttering the harsh, explosive evening "song." At 6:45 p. m. birds were coming in from all directions. Some flew high over the chosen tree, then closed their wings and dived to treetop level where they gracefully banked in for the landing. The birds appeared to demonstrate an ability to remember landmarks since they were all using the same tree that had been occupied by the first flock of the year, even though it had changed aspect from bare limbs to green foliage. Some Bronzed Grackles and a few Mourning Doves also entered the roost tree, causing considerable jostling and shifting of the

various species. Loud squawks indicated interspecific friction. At 7:00 p. m. birds were still arriving steadily, but their flight was rapid and "nervous"; at 7:15, darkness had put a stop to all activity.

On May 10, between 7:15 and 7:30 p. m. the same roost-tree was visited; again the birds were congregating. No nesting activity had been observed up to this date, but some of the males had been observed performing the nuptial flight.

On May 21, between 7:20 and 8:00 p. m., 138 Scissor-tails were observed entering this same roost-tree. The majority came from the west, but birds arrived from every direction. The early arrivals sat on telephone wires or nearby trees, and a few individuals engaged in "games of tag," chasing each other through the open spaces and fighting for brief periods. On this same date a female was seen carrying nesting material near the campus.

On May 28, between 7:30 and 8:00 p. m. at least 136 Scissor-tails entered the tree; this figure is lower than the number actually using the tree. Only three approaches could be watched, and occasionally the birds arrived in such numbers that they could not be accurately counted.

In August, 1946, another roost tree, a large osage orange, *Maclura pomifera*, was discovered by watching the line of flight of birds just before sundown. The birds were approaching from all sides, and before dark more than 200 birds had congregated there. The roost-bound birds were noticeable one mile southwest of the tree, and the succeeding night the roosting flight was observed approximately one mile north of the tree. Again, the birds began passing overhead in ones, twos, and small groups about one-half hour before dark, flying in the direction of the tree which had been used the night before. This roost was used until the birds left in early October. The size of the area served by one roost-tree appears to be at least one mile in radius.

During the breeding season, the female remains on the nest during the night. Not once could the male be found either near the nest, in the nest-tree, or in the immediately surrounding trees. Adult females as well as males were seen roosting in chosen roost trees throughout the breeding season. The females were probably unmated birds or those that had been unsuccessful in nesting. Males apparently always congregate together to roost. In the morning, roosting birds disperse before sunrise. The male is present at the nest shortly after sunrise.

Young birds join the roosting flock as soon as they are able to fly considerable distances. On July 8, 1947, between 7:20 and 8:00 p. m., 12 to 15 immature birds entered the roost-tree. One family of four young and the adult female fed from a nearby power line before going to roost.

In a normal day during the breeding season, therefore, male Scissor-tails leave the roost-tree, return to their nesting areas, and defend the nest and territory, demonstrating typical territorialism. But, at dusk, they congregate with a smaller number of non-nesting females at a chosen roost to spend the night.

Davis (1940) reports a similar behavior in the Fork-tailed Flycatcher, *Muscivora tyrannus*, of South America.

SUMMARY AND CONCLUSIONS

This paper combines previous observations of many workers with those made by the author during an 18-month study in Brazos County, Texas.

This member of the genus *Muscivora* inhabits the prairie-deciduous forest ecotone of south-central United States from March to October; it winters mainly in Central America.

During the breeding season, the Scissor-tail is highly territorial. The female chooses the territory, builds the nest, broods the eggs, and is more attentive to the young than is the male. In matters of nest location, construction and territorial defense, different pairs express individualism, but in care of the young they are uniformly efficient. Three to five eggs, red-spotted on a creamy background, are laid between the middle of May and the middle of July. The nest is located from six to 27 feet from the ground in an isolated location and is constructed in two to four days. Materials used are predominantly miscellaneous plant parts, with occasional feathers or animal hairs. The favored plant in Brazos County is cudweed, *Gnaphalium spatulatum*.

The favored summer food item is grasshoppers. Stomach analyses show that a wide variety of flying insects may be consumed, most of them belonging to families considered harmful or injurious to agriculture. The nestlings are fed, for the most part, on grasshoppers which are carefully crushed by the parent before they are offered as food. The manner of gathering food in short forays and returning to the same perch is characteristic.

The Scissor-tail expresses itself by several distinct phrases. Some are staccato monosyllabic calls, others are polysyllabic and analogous to songs in other species. The most spectacular is the flight song which is an integral part of the nuptial flight. A more subdued and melodious attempt is the "twilight" song of early morning and dusk.

From the time of arrival in the spring until departure in the fall, males, unmated and unsuccessful females, and birds of the year convene nightly to roost in a specific tree. Females with eggs or nestlings do not share this behavior. These females remain on the nest at

night, and are joined at daylight by the male, which flies from roost to nest, defends his territory during the day, and returns again to the roost at night. As many as 250 individuals have been counted as they entered one tree just prior to dark.

Approximately 20 per cent of all eggs laid fail to hatch. Social parasitism (cowbird) caused the abandonment of one clutch in 1947, and unknown predators destroyed three of 16 nests under study in 1946.

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THE AMOUNT OF OVERLAP ALLOWABLE FOR SUBSPECIES

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THE present tendency toward finer and finer subdividing of species into subspecies or geographical races, with formal trinomial nomenclature, is regarded from different viewpoints, both approving and disapproving. Agreement or at least a clarification of the principles to be followed in the applying of subspecific names is to be hoped for. The present paper is a contribution toward the clarification and stabilization of taxonomic practice in regard to lightly defined subspecies.

VARIATION IN THE SPECIES

Every individual bird differs somewhat from every other bird; any local population is at least slightly different from any other, while in appearance some populations differ widely from others of the same species.

These different degrees of variation are illustrated by such examples as the introduced House Sparrow, *Passer domesticus*, in North America in which Lack (1940) found very little geographical variation (Cahoun's (1947) study on the same subject produced more positive results, but his methods do not inspire confidence); the Lincoln's Sparrow, *Melospiza lincolnii*, in which, within the named subspecies, there is much geographical variation below the level at which it is useful to name further races (Miller and McCabe, 1935); the Field Sparrow, *Spizella pusilla*, in which a distinct eastern and western race occupy considerable areas with a broad area of intergradation between (Wetmore, 1939: 240), and such complexes as that of the Sapsucker, *Sphyrapicus varius*, in which some students still prefer to retain the three very distinct types as species.

SETTING THE LIMITS OF THE SUBSPECIES

Subspecies are subdivisions of a species; each has an exclusive geographical range, and characters which separate it from every other subdivision. The limits of subspecies are subjective, in many cases entirely depending on the judgment of the individual taxonomist (Mayr, 1942: 106). To paraphrase—the subspecies (like the genus and family) of the taxonomist is his own creation, and not a natural unit, though based on a natural phenomenon. There are a limited number of borderline cases in which the results of geographical variation grade from subspecies to species, with the development of biological discontinuity (Mayr, 1942). But the border line at the other

extreme, at which subspecies grade into non-namable populations, is marked by no biological phenomena. The taxonomist makes an arbitrary decision. This, being subjective, naturally varies with the taxonomist. In non-mensurable data it may depend on such factors as the personal acuity of color perception (Moreau, 1948: 109); and Taverner (1940: 540) wrote that common practice is to decide "with the assistance of intuition based on experience and personal equation."

However, though most taxonomists have not formulated the principles they follow, a body of convention has grown up, but with wide diversity in practice.

GENERAL PRACTICES

It is generally agreed that subspecies may be separable on average characters. Populations, not individuals, are the units involved. A certain amount of overlap caused by individual variation is permitted without invalidating the subspecies; this is aside from the intergrading populations situated in intermediate areas.

Of course the racial characters used may be apparent only in one sex or in one age group. For example, Rand (1948a) used only the females in his study of the Spruce Grouse, *Canachites canadensis*; and in the northern races of the White-crowned Sparrow, *Zonotrichia leucophrys*, while the adults are quite distinct, the immature birds can not be distinguished (Rand, 1948b).

Huxley (1942: 405), Mayr (1943) and Tucker (1946) asked for a rather broad concept of the subspecies that may include many smaller, slightly differing populations. At the other extreme are such workers as Clancey (1946) who claimed that the validity of a form should rest solely on the measure of constancy of its imputed criteria and not on degree of separability. Apparently he believed that any demonstrable difference is sufficient.

Tucker (1946) has ably pointed out the horrible results of accepting Clancey's principles. He wrote, "any population can be shown to be genetically different from any other, provided only that the technique of analysis is sufficiently delicate and precise. If, then, a demonstrable difference is to be the only criterion, the logical and unavoidable conclusion which follows from this demonstration is that at least in the case of fairly sedentary birds—names should ultimately be given to the populations of every moderately isolated area of woodland, moor or marsh—it is merely a matter of the delicacy of the analytical technique applied to them." This is a *reductio ad absurdum*. A halt must be called at some point.

Tucker suggested that the point at which a halt should be called is

where the multiplication of names begins to retard and confuse the study of geographical variation, a point of view probably acceptable to most taxonomists.

DISSATISFACTION WITH TRINOMIALS

The principle of applying trinomials to populations has been attacked from both sides. On one side Lack (1946) has suggested that subspecific trinomial nomenclature has outlived its usefulness. On the other hand, Harrison (1945) thought that our present trinomial system is inadequate for indicating intergrades and suggested also employing a bifid system. The example he gave, for the population of jays in southeastern England is

$$\text{Garrulus glandarius} \begin{cases} G. g. rufitergum \\ G. g. glandarius \end{cases}$$

indicating the birds are most similar to *G. g. rufitergum* with a tendency toward *G. g. glandarius*. The idea is not new and is more clumsy than the usual method of indicating it as *Garrulus glandarius rufitergum* \cong *glandarius*. This is of course a convention, does not alter our basic trinomial system, and is a sound auxiliary method of referring to specimens.

Huxley (1942), to designate a cline, had advanced another useful adaptation of our trinomial system, which for our Yellow-shafted Flickers would read thus: *Colaptes auratus* cl. *auratus-luteus*, indicating that from one end of the range of the species, where the birds are called *C. a. auratus* to the other end of the range where the birds are called *luteus* there is a gradual change in characters.

Toxopeus in 1930 suggested another adaptation to express relationships, which is in effect a quadrinomial system with one of the names in brackets; van Bemmelen (1948: 326-327) thought this could be used to advantage for birds. But Mackworth-Praed (1943) viewed with disfavor the whole business of four or even five names to express finer "splitting" and suggested we might get such a combination as *Troglodytes troglodytes troglodytes troglodytes indigenus* for a "poor little wren whose distinctiveness is disputed."

There may be, in time, a system evolved for designating finer distinction or more effectively portraying relationships than our trinomial system, but at present our trinomial system is the only satisfactory one. The tendency to go on naming lightly differentiated populations is rendering it less useful, and, as Tucker (1946) said, such practice would result in a situation which "would be a stultification of the whole principle of trinomial nomenclature."

PRESENT CONVENTIONS ON SEPARABILITY

It seems advisable to accept a criterion based on separability as the final test of the validity of a subspecies. Probably most taxonomists use some such test, but what they use is not always apparent from their work, and few have formulated the principles they follow. The most common seem to be:

- (1) the average of one subspecies separable from the average of the other subspecies.
- (2) 75 per cent of one separable from all of the other.
- (3) 50 per cent of one separable from all of the other.
- (4) 75 per cent of one separable from 75 per cent of the other.
- (5) the means of the two forms separable by the sum of their standard deviations (= 84 per cent from 84 per cent).

Before going on to discuss each of these, it is advisable to clear up a number of points.

Range of variation and size of sample.—Though museum taxonomists work with series, these are but samples of populations, and the results of the studies, including the names, are meant to apply to populations. In this connection it is important to remember that the size of the sample tends to determine the range of variation represented. Simpson (1941) has emphasized a point of great importance; in comparing samples, *the observed variation increases with the size of the sample*. For example, the observed variation in a series of 10 birds is only about half that to be expected in a population of 500 birds, and the observed range in five birds is only about half that to be expected in 75 birds. This means that small samples may show no overlap, while the populations from which they are drawn show considerable overlap. In separating subspecies, not only the observed range must be considered, but also the probable total range of variation of the population from which the sample came. The total range can be computed statistically for measurements, but for color the personal element intrudes in ordinary practice.

Assuming a sample of five as having a range of variation represented by the factor 1, the increased range of variation to be expected in the larger sample is shown (approximately) by the following factors.

Size of sample	Factor
5	1.0
10	1.3
20	1.6
30	1.7
40	1.8
50	1.9
75	2.0

<i>Size of sample</i>	<i>Factor</i>
100	2.1
150	2.2
200	2.3
500	2.6
1000	2.7

(Adapted from Table I of Simpson, 1941: 790)

The above are based on averages. Thus, a sample of 75 has, on the average, about twice the range of variation of a sample of five, but this will not be exactly true for every sample.

Overlap.—It is generally agreed that between two subspecies overlap through individual variation may occur without invalidating the subspecies; this is aside from intermediate geographical populations that are intermediate in character. To the question of separability, the number of specimens in the region of overlap is very important.

Ordinarily, one end of the range of variation of one subspecies overlaps one end of the range of the other; this shows a partial overlap. It may be illustrated by the hypothetical example listed below.

<i>Postulated character</i>	<i>Subspecies A</i>	<i>Subspecies B</i>
Wing greater than 180 mm.	95 per cent	0 per cent
Wing between 175–180 mm.	5	5
Wing less than 175 mm.	0	95

In this example, 95 per cent of one subspecies can be definitely and accurately identified and separated from 100 per cent of the other, with 5 per cent unidentifiable or in the zone of overlap. This is an ideal, easy type to work with. With greater or lesser extent of overlap, this is the type of variation usually assumed. It permits working with and identifying positively some percentage of the individuals.

However, in some cases there may be complete overlap in characters, but in frequency of occurrence there is great geographical variation. Almost all the individuals of one subspecies are readily separated from almost all of the other, but a few are indistinguishable. This is illustrated by the following hypothetical example.

<i>Postulated character</i>	<i>Subspecies A</i>	<i>Subspecies B</i>
White-lored.	95 per cent	1 per cent
Grey-lored.	4	4
Black-lored.	1	95

Ninety-five per cent of A is separable from 99 per cent of B, but no percentage of A is separable from 100 per cent of B. In identifying a mixed collection by the characters, one would identify all white-lored birds (96 per cent) as A, and all black-lored birds (96 per cent) as B; four per cent of the birds one would class as intermediates; 95 per cent of the birds would be correctly identified (one per cent would be incorrect), but one would not know which ones.

An approach to this type of overlap probably occurs more often than is realized. Rand (1948c) has summarized a number of cases in which an individual of one subspecies looked more like another. Chapman (1928: 19) in reviewing the variation in the Barbet, *Capito auratus*, repeatedly found individuals in the range of one form which could not be distinguished from specimens of another and quite different form. These he considered as members of the subspecies in whose range they occurred.

DISCUSSION OF CONVENTIONS

Average separable from average.—This seems to be the criterion most commonly in actual use and seems indicated by such statements as:

"Averaging larger than"

"wing usually between 160 and 170 mm."

"wing usually less than 126 mm."

"averages slightly paler than"

"85% different, as a rule, from"

"that certain extreme measurements overlap does not invalidate the distinction."

The conclusions reached are backed by greater or lesser amounts of experience in handling recognized subspecies and in identifying specimens to subspecies. Since these methods have worked for so long, they undoubtedly have value. But, that does not mean they cannot be improved. Such statements as Deignan's (1946: 382) in his review of the Striated Grass Warbler, *Megalurus palustris*, based on 35 usable skins from the study of which he recognized three races; "While it is possible to recognize three geographical forms, this can be done only by a close study of the coloration of the upperparts when the birds are laid out in series; single examples of any population may be racially unidentifiable without reference to the label" make one wonder what percentage are racially unidentifiable.

Would it not remove some of the personal element and contribute toward standardization to state at least what percentage are separable and what are not? Or more simply, state how many of the specimens in the sample are different, and how many overlap and are inseparable.

Seventy-five per cent from all.—The impression one gets from much recent discussion is that the current practice with most taxonomists is to require 75 per cent of one subspecies to be separable from all of another. Actually, many practicing, outstanding taxonomists do not follow this. A. H. Miller does not (see under "75 per cent from 75 per cent), and E. Stresemann does not (see under "50 per cent from all"). An examination of much current work and checking on samples

of some North American races indicates that in much work lower standards are maintained. This is particularly evident when size is the criterion and the average of the one form falls close to or within the range of variation of the other. It is quite evident from the following example that Ridgway in his classical 'Birds of Middle and North America' did not use as strict a criterion.

Ridgway (1916) characterized *Coccyzus americanus occidentalis* as similar to *C. a. americanus* but averaging decidedly larger. The measurements in millimeters he gave (pp. 13, 17) are:

americanus ♂; wing, 135-154 (av. 143.6); tail, 133.5-150 (140.7)
occidentalis ♂; wing, 143.5-154.5 (av. 149.6); tail, 140-155 (av. 147.1)
americanus ♀; wing, 138.5-151 (av. 146.4); tail, 139-151 (av. 145.5)
occidentalis ♀; wing, 144-156.5 (av. 150.4); tail, 133.5-156 (147.2)

The fineness of the distinctions between some North American races is emphasized by Friedmann (1930: 182), who, while rejecting a proposed Madagascar race of *Himantopus himantopus* stated, "It must be admitted, however, that not a few races of North American birds are based on just such vague general differences."

There is one aspect of the "75 per cent from all" convention that is well illustrated by Dunn (1934: 170). In discussing a salamander, *Plethodon cinereus*, he pointed out that 100 per cent of those west of the Mississippi are red-backed, while east of the Mississippi 50 per cent are red-backed and 50 per cent are black-backed. He stated that, if the proportions in the East were altered to 75 per cent black, the two populations might appropriately be given different racial names. This would make 75 per cent of the eastern form (those with black backs) separable from all individuals of the western form (all with red backs) but not even one per cent of the western form (all red-backed) from all individuals of the eastern form (in which 25 per cent would have red backs). Thus, the definition must be worded as 75 per cent of one separable from all of the other, and the converse; else, one gets the anomalous situation of A being separable from B, but B not separable from A. This is illustrated by tabulating the data thus:

	Subspecies A	Subspecies B
Red-backed,	75 per cent	0 per cent
Black-backed,	25	100

Seventy-five per cent of A is separable from all of B, but not even one per cent of B is separable from all of A. To be logical, the criterion should enable both A and B to be valid, as many taxonomists would consider them. Note that even if the 75 per cent were carried to 98 per cent the same difficulty would arise.

It can be argued that the "75 per cent from 100 per cent" can be con-

verted by statistics to equal "96 per cent from 96 per cent." However, this would mean that one would have to have 25 specimens of each form before one would expect overlap to the extent of one specimen (that is, 24 out of 25 different). Obviously, much work is done on smaller samples, and overlap is permitted in these smaller samples. Thus, to consider much current work now admitted as valid, the convention would have to be less selective.

Fifty per cent from all.—This criterion that 50 per cent of one population be separable from all of another is advocated by Stresemann (1943) and it or standards similar to it are probably widely used, judging by studies of current workers.

This "50 per cent from all" has the same advantages and disadvantages of any "per cent from all," as mentioned under the preceding section.

It can be shown by statistics, that "50 per cent from 100 per cent" practically equals "93 per cent from 93 per cent." It appears surprisingly little different from "75 per cent from 100 per cent." It makes more allowance for the few extreme specimens. Using this, in samples one would not expect any overlap until 14 specimens of each were compared.

This is more practical, and much nearer current usage than "75 per cent from all."

Seventy-five per cent from 75 per cent.—This convention is that 75 per cent of one subspecies be separable from 75 per cent of the other. Also, 75 per cent of a mixed series will be correctly identified. This means that 100 per cent of a mixed series will be identified, with only a 25 per cent error, but one will not know which specimens are incorrectly identified. The identification has shifted from the individual to the population (quite properly), and the sample is identified by the percentage of different characters in it.

Rand used this in his Spruce Grouse, *Canachites canadensis*, study (1948). Miller also used it, or something very close to it in his Junco study (1941: 264). Miller recognized the race of Junco, *J. o. shufeldti*, as different from the race *J. o. montanus* on the basis of size. He said males of *shufeldti* are usually (75 per cent) less than 77 millimeters in wing length; males of *montanus* usually (85 per cent) more than 76 millimeters in wing length. The corresponding figures for the females are 66 and 85 per cent. Miller stated that by using these measurements, one can separate 75 to 80 per cent of the individuals of the two geographic groups.

In applying this criterion of "75 per cent from 75 per cent," it demands that only three out of every four specimens be separable.

Eighty-four per cent from 84 per cent.—This is similar to the "75 per cent from 75 per cent" convention but more selective. It was used by Brodtkorb (1944) in separating the Black Vultures into races. This percentage was chosen because of a statistical principle; if the averages of two samples differ by the sum of their standard deviations, at least 84 per cent of one form will be separable from 84 per cent of the other, a degree of difference "usually accepted as the minimum for sub-specific separation."

A sample of seven birds (actually 6.2) must be examined before any overlap should be expected.

Ninety-three per cent from 93 per cent.—This would correspond with the degree of difference of those who advocate a "50 per cent from 100 per cent" separation. A series of 15 birds (actually 14.2) would be necessary before any overlap should be expected.

Ninety-six per cent from 96 per cent.—This would correspond with the degree of difference demanded by those who advocate a "75 per cent from 100 per cent" separation. A series of 25 birds must be compared before any overlap is to be expected.

In considering a given percentage of one population separable from the same percentage of another, the following shows the smallest series of each form that can be used with each percentage and any overlap expected.

75 per cent	= 4 birds (that is, 3 out of 4 birds)
84	= 6.2 (7)* birds (6 out of 7)
90	= 10 birds (9 out of 10)
93	= 14.2 (15)* birds (14 out of 15)
96	= 25 birds (24 out of 25)

* As one can not use 0.2 of a bird, the next largest number must be used.

"A percentage from all" versus "a percentage from a percentage."—Each system has its advantages, and its disadvantages. The "percentage from all" has the advantage that a given percentage of specimens can be positively identified as individuals. The main criterion here is not average difference but is the non-occurrence of certain characters.

The disadvantages are that, in defining races, definite limits are set to the "zone of overlap," both upper and lower limits, on the basis of the samples. But as variation is greater in large samples this "zone of overlap" will vary with the size of the sample, and in larger samples individuals will occur outside the originally defined limits and may even resemble more closely the neighboring subspecies. Various methods have been used to explain the presence of such individuals. Some taxonomic treatment may obscure their occurrence, especially in North America where migration is pronounced, by treating them as

wanderers or migrants (Rand, 1948c). Another way of treating this type of phenomenon has been to consider each type as representing different species. This was often done with the two races of White-crowned Sparrows, *Zonotrichia leucophrys leucophrys* and *Z. l. gambelii*. Over most of the range of *Z. l. leucophrys* the species has black lores, and it has been customary to identify only white-lored specimens as *gambelii*.

Yet another way to treat this embarrassing type of overlap is to call such specimens freaks and not include them in the data. This is illustrated by Rogers' (1939) treatment of measurements when he described the White-throated Swift, *Aeronautes saxatilis sclateri*. The difference is in size, especially that of the wings—wings of male *sclateri* range from 143 to 151 and average 146.3 millimeters; *saxatilis*, 128 to 145 and average 139.15. However, in a footnote it is stated that one specimen of *saxatilis* measured 147 millimeters. Apparently this was omitted as an exceptional measurement, although only two millimeters greater than the next largest, because, otherwise, the average of the larger form would have fallen within the range of variation of the smaller. This is a quite unjustified treatment. The more extreme specimens are unusual or "freaks" simply because they occur less often. As such they affect averages little, but they are part of the population.

Another way of avoiding embarrassing overlap was used by Oberholser (1914): "The specimens used in the average measurement under each subspecies, and with which comparisons are made, are taken just as far as possible from typical specimens—that is, from specimens best exhibiting the differential characters." This sounds like rigging the evidence and is inexcusable.

Working with species showing such overlap it is no longer possible to identify individual specimens with absolute certainty, but it is still possible to identify populations by their composition. It is necessary to revise our thinking. We identify 100 per cent of a mixed collection and 95 per cent may be correctly identified; we can't tell which five per cent is incorrectly identified but that does not matter.

The "percentage from a percentage" has the advantage that it deals with populations. When the dividing point between two subspecies is properly set, with moderate sized samples the proportions above and below this line will remain constant with increase of sample size.

The disadvantage is that a situation could occur in which no individual can be identified with certainty. This is inherent in the problem; we are dealing with populations with average differences, and any

population, or sample of it, can be analyzed to see in what proportions the characters exist and can be identified accordingly. This can even be done in zones of geographical overlap, or in winter range; see Rand and Traylor (1949) for use in Catbird.

A SUGGESTION

From the cases examined it appears that the separability often used is less than 75 per cent from 100 (or 96 per cent from 96 per cent) which is sometimes implied in discussion. It seems that some standard of about 80 to 90 per cent of one race separable from about 80 to 90 per cent of the other would actually correspond with much current conservative practice. Perhaps this would be the most practical.

But even more important would be the practice of stating clearly the number of the specimens examined that actually were different and the number that showed overlap.

APPENDIX

To illustrate the degree of separability exhibited by some North American races the three following analyses of species with more or less lightly defined subspecies are given.

(1) The Mourning Dove, *Zenaidura macroura*, is currently considered as divisible into two lightly differentiated races in the United States, *carolinensis* (Wisconsin and Iowa to the Gulf Coast and eastward) and *marginella*, larger and paler, farther west. The distinctions between the two races are usually considered slight. The material in the Chicago Natural History Museum from Saskatchewan to British Columbia south to California and Arizona was considered to represent *marginella*, and material from Wisconsin to Connecticut and south to Florida, *carolinensis*, in making the following comparisons (only males used).

Wing-length (measured flat)	144	5	6	7	8	9	150	1	2	3	4	5	6	7	8	9	160	1	2	3	4	165	millimeters
	75 per cent																						
<i>carolinensis</i> (10 birds)	1	1	2				1	1	1	1	1	1											
	75 per cent																						
<i>marginella</i> (12 birds)													3	3	1	1	1			1		2	

The averages of these two series, 149.8 and 157.3 millimeters, are farther apart than those recorded in a recent study of this species by Pitelka (1948: 121).

Color was estimated by laying out the summer, worn birds in a graded series from dark to light. For tabulation purposes this series, in which the graduation appeared uniform, was divided into eight nearly equal parts. The results are:

	Dark				Light			
	I	II	III	IV	V	VI	VII	VIII
<i>carolinensis</i> (11 birds)	4	3	1	1	1	0	1	
	75 per cent				75 per cent			
<i>marginella</i> (14 birds)	0	0	2	2	3	2	3	2

To reduce the possibility of wear and fading being greater in the more arid west, fall and winter birds in unworn plumage from Connecticut, Georgia and Florida representing *carolinensis*, and birds from Oregon, New Mexico and California, representing *marginella* were compared after being placed in nearly uniformly graded series and this series divided into five units. The results:

	Dark			Light	
	I	II	III	IV	V
<i>carolinensis</i> (9 birds)	2	3	2	1	1
	75 per cent			75 per cent	
<i>marginella</i> (4 birds)			1	1	2

In this species it would appear that the recognized subspecies are separable on about a "75 per cent from 75 per cent" convention.

(2) *Ceryle alcyon*: Rand (1948b: 31ff) showed that the difference between the eastern and the western races was one of size, and that it was more apparent in the female. His measurements are as follows:

Wing-length in females: 148 9 50 1 2 3 4 5 6 7 8 9 160 1 2 3 4 5 6 7 8 9 170 171 millimeters	
<i>alcyon</i> (18)	1 0 0 0 1 1 2 2 1 1 2 1 4 0 1 0 1
<i>caurina</i> (10)	5 1 1 0 2 0 1

In the sample itself 100 per cent of *alcyon* is below 165; 100 per cent of *caurina* is above 164 millimeters. On the basis of this sample, of 18 and 10 birds, it would appear that the separability in the population was greater than "90 per cent from 90 per cent", since no overlap occurs in two series of at least 10 specimens each, but the distribution of the measurements in *caurina* is unusual and more smaller birds would be expected.

Adding to the above figures those of the females in the Chicago Natural History Museum, one gets, as expected, a greater range of variation in *alcyon* where the greater increase in number of specimens was made, and none in the *caurina* sample where few were added. The combined figures for wing-length in females are:

148 9 150 151 2 3 4 5 6 7 8 9 160 1 2 3 4 5 6 7 8 9 170 171 millimeters	
<i>alcyon</i> (44 birds)	1 0 2 0 1 1 3 1 4 4 4 3 7 1 5 0 2 4 0 0 0 0 1
	90 per cent
<i>caurina</i> (12 birds)	5 1 3 0 2 0 1
	90 per cent

In this sample, 88 per cent of *alcyon* is separable from 90 per cent of *caurina*, but not 20 per cent of *caurina* can be separated from all of *alcyon*. On a "75 per cent from 100 per cent" convention *caurina* does not qualify; on a "90 per cent from 90 per cent" *caurina* just fails to qualify (88 per cent instead of 90 per cent). Undoubtedly, more measurements of *caurina* would add to the overlap.

(3) Brown Thrasher, *Toxostoma rufum*: The Western Brown Thrasher has been recognized as *Toxostoma rufum longicauda* on the basis of size (Wetmore, 1939). The measurements given below are for our Chicago Natural History Museum material.

Wing, male adult, millimeters		98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	118
		60 per cent																
Maine to Dist. Columbia		1	1	1	3	3	3	3	6	5	4	2	2					
Ill., Ind., Wis.					1	3	0	3	2	2	0	1	0	0	1			
		60 per cent																
Alta., Sask., Mont., Col.									2	1	1	1	0	1	0	0	3	0
Man. and N. Dak.									1	3	0	0	0	0	0	0	1	1
Tail, male adult, millimeters		112-	114-	116-	118-	120-	122-	124-	126-	128-	130-	132-	134-	136-	138-	140-		
		113	115	117	119	121	123	125	127	129	131	133	135	137	139	141		
Me. to Dist. Col.		2	0	2	1	7	7	5	4	2	0	2	0	2	1	1		
		60 per cent																
Ind., Ill., Wis.	2	0	0	1		4	2	2	0	1	0	0	0	1				
Man. and N. Dak.						1	0	0	3	0	1							
		60 per cent																
Alta., Sask., Mont., Colo.						1	0	1	1	1	1	2	0	1	2			

On this data on wing-length, comparing east coast thrashers with those of Alberta, Saskatchewan, Montana and Colorado, slightly over 60 per cent of one is separable from 60 per cent of the other. On tail-length the separability is a bare 60 per cent, and the race fails to qualify by any criterion discussed.

SUMMARY

Subspecies are subjective, though based on natural phenomena, and treatment varies as to the fineness of distinctions used in recognizing subspecies. Some workers claim any constant difference is enough; at the other extreme are those who ask that 75 per cent of the individuals of one subspecies be separable from all of another. Size of sample must be allowed for in making comparisons. With subspecies, overlap may be partial, or it may be complete but of rare occurrence. Current conventions are discussed. As subspecies are often based on average differences, rather than on non-occurrence of characters, a "percentage from a percentage" rather than a "percentage from all"

convention is advisable. A conservative value is suggested—80 to 90 per cent of one subspecies separable from 80 to 90 per cent of another before they be recognized. In any case, the degree of separability should be given in discussing races.

Three examples are given of the application of this treatment to more or less lightly defined races.

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Chicago Natural History Museum, Chicago, Illinois, January 25, 1949.

WILFRED HUDSON OSGOOD, 1875-1947

BY KARL PATTERSON SCHMIDT

WILFRED HUDSON OSGOOD was one of the leaders of his generation in the zoological exploration of the two Americas and one of the most influential of museum curators in an era of phenomenal expansion of museums of natural history. He was a survivor of a golden age of systematic zoology in North America, and even through the radical changes of emphasis in modern zoology he commanded the respect of his colleagues in universities as well as in museums. American zoology was enriched by his thoughtful and permanently useful contributions, some of which have had a long-continuing influence in ecology and genetics. Even his short papers describing new species were organized and reflective of sound judgment based on command of the whole range of systematic mammalogy. It becomes those of his successors who knew him best to reflect on his career, to examine its meaning, and to subject it to thoughtful analysis for the lessons derivable from it. It is not the purpose of this essay to attempt a critical evaluation of the man and of his influence, which will find an appropriate place in a history of American natural history museums, when that is written. Though his reputation was mainly in mammalogy, he could by no means forget his first love—ornithology—and from his election as a Fellow of the American Ornithologists' Union,

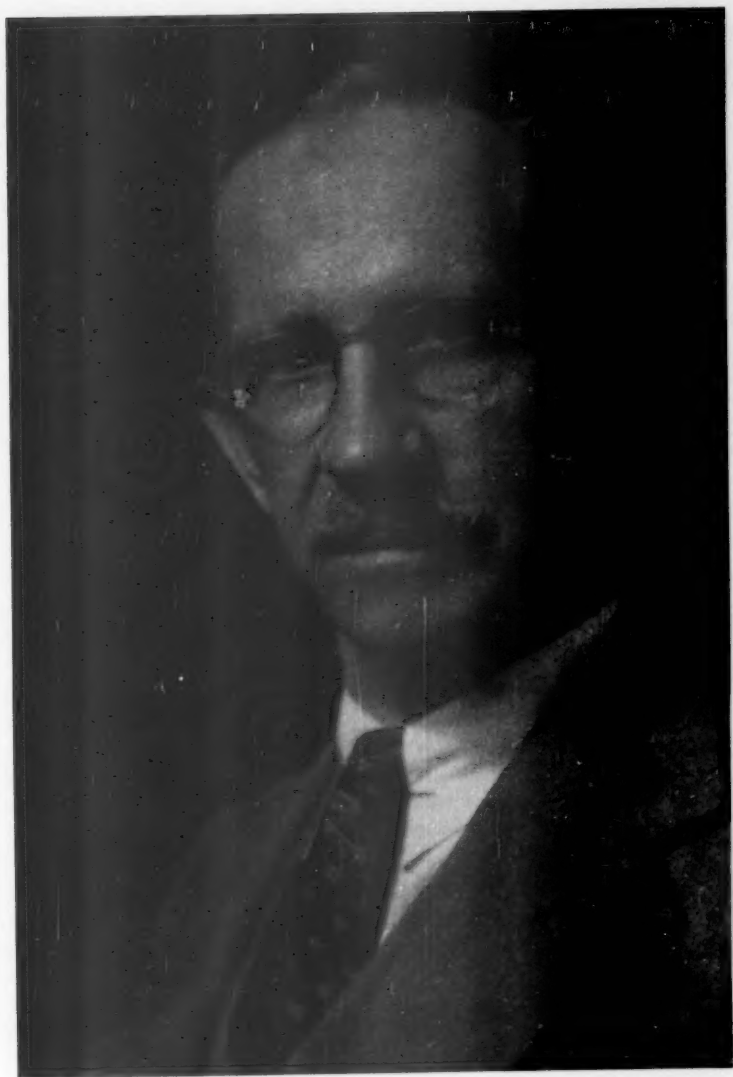
it was clear that this collateral interest was recognized and appreciated by his ornithological contemporaries and friends.

The young naturalist-to-be was the eldest son in a New Hampshire family. The family was of old New England stock, the first Osgood having come to America from England in 1633. On his mother's side, his ancestry was also English, and Wilfred seems to have been influenced especially by a maternal uncle, Charles Harker. In 1883, when he was twelve, the family with its five children, and including Charles Harker, transplanted itself to a fruit farm in the central valley of California, near Santa Clara. If there be regional differences among the inhabitants of the United States, Wilfred Osgood remained a New Englander. His father and grandfather were watchmakers, and it is not difficult to see something of the watchmaker's habits of precision and attention to detail in their son and grandson.

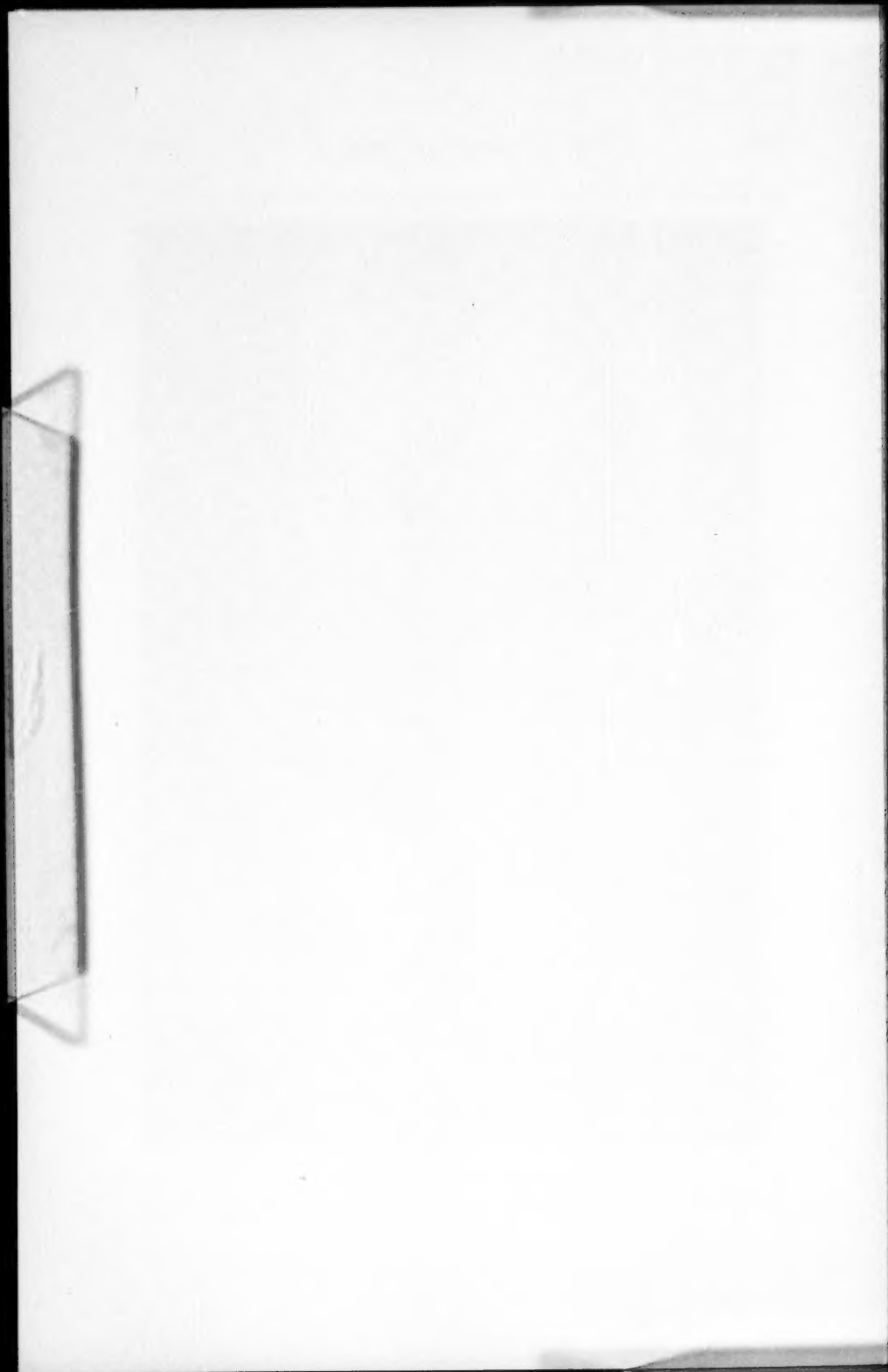
The ten years in the west, however, included Wilfred Osgood's high-school career, a year of school teaching in Arizona, and his college years at the University of the Pacific and at Stanford; they could not fail to leave their stamp on his character, and Californian influences clearly governed the direction of his career. He valued his association with the young collectors of birds' eggs who formed the nucleus of the Cooper Ornithological Club—among them Chester Barlow and Rollo H. Beck. At Stanford University, then newly established, he came under the influence of Charles H. Gilbert in the Department of Zoology, and in contact with David Starr Jordan, Stanford's first president, one of the more redoubtable "Old Bisons" of the zoological world of the eighteen nineties. At Stanford, Wilfred Osgood formed what was to be a deep and lifelong friendship with Edmund Heller, whose later travels as a zoological collector were even more extensive than his own. Wilfred Osgood and Edmund Heller were associated in the field in 1900 in faunal studies on the Queen Charlotte Islands and in the Cook Inlet region of Alaska.

Before completing his undergraduate work at Stanford, at the age of 22, young Osgood joined the expanding staff of the Bureau of Economic Ornithology and Mammalogy, of the United States Department of Agriculture. This organization, later to become the Bureau of Biological Survey, was under the dynamic if erratic leadership of C. Hart Merriam. Osgood's first formal field work, in 1898, was on Mt. Lassen and Mt. Shasta in company with Merriam, Vernon Bailey, and W. K. Fisher.

Merriam's vision of a biological survey of the North American continent afforded a program sufficiently challenging to capture the imagination of an aspiring young biologist, to stimulate his ambition,



WILFRED HUDSON OSGOOD, 1937



and to hold his loyalty. When Osgood went to Washington, at the age of 23, he lived in the Merriam home for some years, half as apprentice, half as valet. He gracefully and tactfully acknowledges his debt to Merriam in a biographical memoir, which gives a critical and thoughtful estimate of this remarkable personality. It seems evident that young Osgood learned what *not* to do quite as much as what to do from the example of his chief. In the Merriam home he came in contact with many of the great and near-great of the Washington scientific world, and among his associates in the Survey he formed his deepest friendships.

The principal outward events of his twelve years with the Biological Survey were his continuing travels in western and northern North America. These gave him a command of the geography of the continent and especially of Alaska. In this period fell the preparation of two systematic reviews of genera of rodents. The first of these, the 'Revision of the pocket-mice of the genus *Perognathus*' (1900) was really a preliminary exercise, preparing him for the attack on the 27,000 specimens to be examined for the monumental 'Revision of the mice of the American genus *Peromyscus*' (1909). More than any other work, this established Osgood's reputation. With critical and scholarly care he untangled what had become a snarl of inadequate descriptions and classifications, and produced an arrangement of the recognizable species and subspecies of the small rodents known familiarly as deer-mice or white-footed mice that has stood the test of forty years of use. This work, which came before the introduction of statistics, was far in advance of its time as a study of variation and of what has now come to be called "speciation." It formed the foundation for the crucial biological experiments of Charles B. Sumner; these proved that the quite trivial differences of coat-color and dentition and skull form that characterize the subspecies of *Peromyscus* are heritable. Thus when the subspecies are correlated with peculiar types of environment, their characteristics must have become fixed by genetic drift or by natural selection, and have not resulted from the direct (Lamarckian) effects of the environment. Nor was this the last of the reverberations of the "Revision of *Peromyscus*." The Laboratory of Vertebrate Biology at the University of Michigan, under Lee R. Dice, has picked up the threads of the speciation question where Sumner left off, and, together with attack on many other problems, has applied ecological experiment to the question of how and why the species and subspecies of white-footed mice differ as they do.

With the rich, double experience of wide travels as a zoological

collector and sound scholarly studies of the accumulated collections, Wilfred Osgood came to the still young Field Museum of Natural History in Chicago in 1909. As the result of a comedy of errors, he came to replace his friend Heller, who had left the Museum's Department of Zoology to join Theodore Roosevelt in his East African Expedition for the Smithsonian Institution. The new curator's first duties were, in fact, to describe the smaller mammals collected by Heller in East Africa on an earlier expedition for the Chicago Museum.

The first "Expedition" (the museum euphemism for field study and collecting) for the Field Museum took him to Colombia and Venezuela in 1911, and this set a pattern of interest in the mammals of South America that continued to the end of his life, and found expression in numerous descriptions of new species of mammals and in faunal papers. Of these the most notable is 'The Mammals of Chile,' published in 1943, twenty-one years after his first trip to that country in 1922. Like American museum zoologists in general, Wilfred Osgood alternated active travel, collecting, and observation in the field with intensive studies in the laboratory and the preparation of reports on the collections made. As his work for the Biological Survey had made him an authority on the geography of Alaska, and especially an authority on its bird and mammal faunas, so his six major trips to South America for the Field Museum (now Chicago Natural History Museum) made him the acknowledged leader in the mammalogy of that continent. The record of these expeditions has been set forth elsewhere by his colleague and successor in the Museum's Division of Mammals, Colin Campbell Sanborn.

As the Bachelor's degree from Stanford had to be granted *in absentia* because he was already launched as an undergraduate on what was to be his life work, so also the Ph.D. degree from the University of Chicago came late and was merely incidental to a research career. His thesis was the 'Monographic Study of the American Marsupial *Caenolestes*,' published by the Museum in 1921 as a full volume in its Zoological Series. This work gave the first adequate account of a remarkably interesting creature, at first thought to exhibit direct relations with the Australian marsupials, and important for the light it throws on a great number of extinct genera known from the South American Tertiary.

Two major field trips fell outside the South American pattern. The first of these, the Field Museum-Chicago Daily News Abyssinian Expedition was on a properly expeditionary scale, with a distinguished staff, which included the great animal artist, Louis Agassiz Fuertes. A journey into the interior of Ethiopia to Lake Tsana was made by

camel and horse caravan, departing via the Blue Nile and the Nile. The work of the expedition is recorded, in addition to the series of syndicated reports to the Chicago newspaper, in Dr. Osgood's thoughtful essays in 'Natural History' and in the 'National Geographic Magazine,' by the 'Album of Abyssinian Birds' by Louis Agassiz Fuyertes, and in 'Artist and Naturalist in Ethiopia' by Fuyertes and Osgood, which combined the diaries of the two friends and forms a touching memorial to Fuyertes, whose tragic accidental death took place shortly after the return of the party from Africa.

The second of the non-American expeditions was a collecting trip to French Indo-China in 1939. This was financed by Dr. Osgood himself and was apparently the only major trip on which he travelled alone.

The two major collecting expeditions to Chile dominated the last phase of Osgood's career. These expeditions were focussed on the study and collecting of birds and mammals, with a by-product of amphibian and reptile collections. In these expeditions, which were in part "On Darwin's Trail," he was engaged in the preparation of a definitive account of the mammals of a faunally definable segment of "Neogaea." The resulting volume, 'The Mammals of Chile,' must be placed with the revision of *Peromyscus* and the monograph of *Caenolestes* as a third technical work of major importance. It embodies an acute study of all the collections available with a scholarly incorporation of past work on the mammalian fauna of Chile.

Much of Osgood's fine scholarship was incorporated in the 'Check-list of South American Mammals' which was left unfinished in the hands of his successors in the Division of Mammals at the Chicago Natural History Museum. He was engaged on this check-list and on the completion of the Chilean work during his seven years as *Curator Emeritus* at the Museum. These years, in which he was relieved of the volume of popular writing for the Museum's 'Bulletin' and of the burden of administrative routine, may well have been among the happiest of his life.

Osgood's world wide travels were carefully planned and competently carried out. They present an aspect of his capacities quite different from that of the popular concept of a scholar. Equally foreign to narrow scholarship was his continued interest in expansion of exhibition in the halls of the Chicago Museum. His regime as Chief Curator of the Department of Zoology (succeeding Charles B. Cory) coincided with a period of expansion of the museum in the new building to which exhibits and collections were moved in 1921. Whole new halls of habitat groups were planned and finished, and new types of presenta-

tion in the systematic halls were devised. The importance of subjective aspects of exhibition was thoroughly appreciated by him and was well set forth in essays in the 'Britannica Book of the Year' (1938, 1939) and in the 'Field Museum News.'

As to the personal Osgood, he molded a staff that maintained an extraordinary degree of good relations within the museum. His editorship of the scientific papers of the junior members of his staff was extremely competent and helpful, in the matters of content and organization as well as in details of composition. I well remember the difficulty of arguing with him about usage of vernacular zoological terms. He could always refer me to 'Webster's Dictionary' and I only later learned that he had himself written or rewritten the definitions. We all envied him the ability to write page after page with scarcely an interlineation.

My own relations with Dr. Osgood (as I mostly addressed him) became more and more friendly during our 25-year-long, staff relationship. After bringing me to the Chicago Museum, he left me free to develop my career as our resources and my abilities permitted. In this our relations were almost a repetition of those of Dr. Osgood with his own predecessor, as is related in his appreciation of C. B. Cory in an earlier volume of 'The Auk.' When it was arranged that I should succeed him as Chief Curator of the Department, we became still more intimate. We jointly planned to have a few weeks together in the field, in Chile, as part of the 1939 Magellanic Expedition. This plan failed, and it is a matter of deep regret to me that I could not personally know the side of "The Chief" that was well known to his companions in field and camp. At home and in the Museum he was reserved and even aristocratic in temperament. In the field the basic simplicity and humility of his character was brought out, reflecting, perhaps, his life-long familiarity with mountain and forest and his deep love of the wilderness.

His later friendships were largely outside the museum, for he sadly outlived the intimate circle of such early naturalist friends of the Cooper Club and the Biological Survey as Barlow, Hollister, Heller, and Fuertes, who had been his campmates. His social gifts were great, and he was a valued member of the University and University Club circles in which he moved. A bachelor all his life, he exhibited no touch of misogyny and was a favorite in mixed company, notably in a group that engaged in readings of classical and modern dramatic works, with parts assigned to the individual members. His outdoor recreation was mainly golf and fishing, but for his vacations he turned more and more to short field trips for the collecting of the small rodents of which he was so genuinely fond.

It is interesting, then, to reflect on the life of a naturalist so typical of his generation. The roots of his career lay in the field-collecting era that produced and was produced by the vogue of private collections of birds, birds' eggs, and mammals. He lived through and played a part in the period of great expansion of the United States Bureau of Biological Survey, which in his day devoted its energies and funds to a program essentially in pure science—the faunal survey of a continent and the attempt to derive meaning from its results. As head of a Division of Mammals and Chief Curator of a Department of Zoology in a great museum for thirty years, he helped to make both his Department and his Museum great. In the course of his career he acquired more than a specialist's command of his subject, so much so that he should be enumerated among the foremost of mammalogists, not merely of his own time, but of the whole period of the rise of systematic zoology since Linnaeus.

Chicago Natural History Museum, Chicago, Illinois, January 7, 1950.

THE RACES OF THE COLLARED SCOPS OWL,
OTUS BAKKAMOENA PENNANT

BY H. G. DEIGNAN

In an attempt to settle the vexing question of names to be used for the Collared Scops Owls of the Indo-Chinese Subregion, I have brought together a series of almost 150 specimens from nearly every part of the Asiatic range. With so many of the named forms before me, it has seemed worth-while to study the group as a whole and to present the results of such a survey for the benefit of those whose series are more limited.

It is not suggested that the present arrangement is otherwise than tentative. The much richer material at hand has led me to change opinions held in 1939, when I last investigated the Indo-Chinese races (Friedmann and Deignan, *Journ. Wash. Acad. Sci.*, 29: 289–291, 1939), and I shall perhaps adopt other views when suitable specimens are available from certain critical areas.

Owing to the individual variation appearing in almost every character of any given form, it is scarcely possible to identify these owls except in numbers from topotypical populations. Twenty-two subspecies, of which two are proposed for the first time, are here considered recognizable in series.

For the loan of valuable material my thanks are due the authorities of the American Museum of Natural History, of the Academy of

Natural Sciences of Philadelphia, and of the Museum of Vertebrate Zoology, and for permission to make a personal examination of specimens in their collection, those of the Chicago Natural History Museum.

1. *Otus bakkamoena ussuriensis* (Buturlin)

Scops semitorques ussuriensis Buturlin, *Messenger ornithologique*, 1 (2): 119, May 1-14, 1910 (Khanka Lake, Ussurii Area, Siberia).

?*Otus bakkamoena aurorae* Allison, *Notes d'Ornithologie* [Musée Heudel], 1 (2): 2, May 30, 1946 ("taken in October . . . on vessels off the North China Coast").

Toes feathered.

REMARKS: According to Taczanowski (*vide* Hartert, *Vögel der paläarktischen Fauna*, 2: 976, 1913), this form should be more reddish than *semitorques* of Japan. Buturlin, however, described it as paler than the Japanese bird, especially in its light markings. Hartert (*loc. cit.*) found no color distinctions between *semitorques* and one specimen from Vladivostok. In the absence of any topotypical material, I am unable to reconcile these conflicting statements, but accept the race because it has been held valid by Japanese ornithologists and because of the specimen discussed below.

A female with a wing length of 187 mm. (A. N. S. P. No. 107584), shot at Wei-hsien, Shantung Province, China, on April 3, differs from every one of a series of 22 adults from the Japanese Archipelago (*semitorques*) by its paler, grayer tones and by having the light markings of the upper parts buffy white rather than warm buff. It thus seems to match Buturlin's description of *ussuriensis* and might be considered a winter visitor to Shantung. Peters (Check-list of Birds of World, 4: 98, footnote 1, 1940) has suggested that a Hupeh bird of January 29 is similarly a winter straggler of *ussuriensis*.

There remains, however, the possibility that comparison of breeding material from Ussuriland with adequate series from the northeastern provinces of China will disclose the existence of an undescribed race in this area, to which the odd specimens from Shantung and Hupeh may well belong. It is difficult to believe that no Screech Owl inhabits the vast expanse of territory between the Yangtze and Manchuria, as our present lack of knowledge would seem to indicate.

Allison's *O. b. aurorae* is here considered a probable synonym of *ussuriensis*, a form evidently unknown to the author, but it might prove applicable to the hypothetical race discussed just above.

2. *Otus bakkamoena semitorques* Temminck and Schlegel

Otus semitorques Temminck and Schlegel, in Siebold, *Fauna Japonica*, Aves, pt. 1: 24, pl. 8, "1850" = 1844 (Japan; type locality here restricted to Nagasaki, Kiusiu Island).

Otus bakkamoena lineae Floericke, Mitt. Vogelwelt: 103, 1921 (North Japan).

Otus bakkamoena sidai Momiyama "in litteris," Tori, 7 (33 and 34): 320, May 31, 1932 (Samen and Umen, Quelpart Island, off southern Korea). *Nomen nudum!*

Toes feathered.

Twenty-two adults from Japan are virtually uniform in the coloration of the upper parts, having them generally brown with buff markings, and thus differing from the specimen believed to represent *ussuriensis* as described above.

WING LENGTH: 153-184, once 194 mm. (22 specimens).

SPECIMENS EXAMINED: "JAPAN": no definite locality (3 unsexed). HOKKAIDO: Hakodate (3 males, 2 females). HONDO: Tokyo (2 males, 1 female, 1 unsexed), Yokohama (3 males, 3 unsexed), Matsumoto (1 female). KIUSIU: no definite locality (1 female), Nagasaki (1 female?). TSUSHIMA: no definite locality (1 female).

REMARKS: The extraordinary variation in wing length that appears in this series cannot be rationalized by sex or locality; five specimens from Hokkaido measure from 156 to 178 mm., while 16 from Hondo and Kiusiu are from 153 to 184 mm., and the female with exceptional wing length (194 mm.) was taken on June 2 in Tsushima.

Although *ussuriensis* is usually given as the race of Korea, a bird collected on March 20 at Fusan, with a wing length of 182 mm., is quite inseparable from the 22 Japanese specimens. It is probable that *ussuriensis* is the breeding form of northern Korea and even reaches southern Korea in winter, but I suspect that *semitorques* will prove to be the resident race of the south, especially since it is the only one recorded from Tsushima and Quelpart Island.

The birds from Japan are so similar to topotypes of *Otus asio kennicottii* (Sitka, Alaska) and *O. a. "saturatus"* (Victoria, Vancouver Island), and especially to the latter, that I believe there can be little question of their being conspecific. Their near relationship was long ago remarked by Ridgway (Baird, Brewer, and Ridgway, Hist. N. Amer. Birds, 3: 55-56, 1874), who, referring to *kennicottii*, said:

"In general appearance, size, and proportions, as well as in pattern and tints of coloration, except in their details, there is a wonderfully close resemblance in this race of *[Scops]*. *asio* to the *S. semitorques*, Schlegel, of Japan. Indeed, it is probable that the latter is also a mere geographical form of the same species. The only tangible points of difference are that in *semitorques* the jugulum is distinctly white centrally, there is a quite well-defined lighter nuchal band, with a more indistinct occipital one above it, and the pencillings on the lower parts are more delicate. The size and proportions are essentially the same; the shades of color are identical, while the markings differ only in minute detail, their pattern being essentially the same.

In *Kennicotti* the light nuchal collars are indicated, though they do not approach the distinctness shown by them in *semitorques*."

Specimens of "*saturatus*," as mentioned above, are even more like *semitorques*, and at least one of four topotypes, when placed in the Japanese series, is not readily separable by characters either of upper or under parts.

The agreement appearing in skins of Screech Owls from northeastern Asia and northwestern America is matched by their similarity in colors of soft parts, habitats, behavior, and calls. Since from *ussuriensis* to the small, saturate (in humid regions) or washed-out (in arid regions) races of southern Asia, and from *kennicottii* to the similar races of the southern United States, there are unbroken chains of forms that intergrade with their neighbors so insensibly as to be distinguishable only in series, the temptation is strong to consider all the Asiatic birds subspecies of *Otus asio* (Linnaeus), 1758. That a contrary course has been followed in the present study is in deference to the opinion of Dr. Alden H. Miller of the Museum of Vertebrate Zoology, who has correctly pointed out that *O. trichopsis*, in some areas sympatric with *O. asio*, might equally well be considered an American representative of *O. bakkamoena*.

3. *Otus bakkamoena pryeri* (Gurney)

Scops pryeri Gurney, Ibis, ser. 6, 1 (3): 302, July, 1889 ("Rynkyn Naba" = Naha, Okinawa Island, Ryu Kyu Islands, northeast of Formosa).

Otus bakkamoena hatchizionis Momiyama, Dobuts. Zasshi, 35: 400, 1923 (Hachijo Island, Seven Islands of Izu, south of central Hondo).

Toes bare.

This race differs from *semitorques* by having the toes unfeathered and by having the plumage, above and below, strongly ferruginous.

WING LENGTH: 151 and 173 mm. (2 specimens).

SPECIMENS EXAMINED: OKINAWA: "northern part" (1 unsexed), Hedo (1 male).

REMARKS: No specimen has been seen from Hachijo, and I have followed the Ornithological Society of Japan's 'Hand-List of the Japanese Birds,' ed. 3, rev.: 98-99, 1942, in synonymizing *hatchizionis* with "*pryeri*."

4. *Otus bakkamoena erythrocampe* (Swinhoe)

Lempijius erythrocampe Swinhoe, Ibis, (ser. 3) 4: 269, July, 1874 (Canton, Kwangtung Province, China).

Toes bare.

Nearest *O. b. semitorques* (Japan) in its brown upper parts with buff markings, but of a somewhat deeper color; from *O. b. glabripes* (Formosa) and *O. b. umbratilis* (Hainan) separable by the redder, less grayish, brown of the upper parts and by the less distinct dark markings; distinguished from *O. b. lettia* (eastern Himalayas) by the much deeper, less buffy, brown of the upper parts and by the less distinct dark markings.

WING LENGTH: 173-180 mm. (4 specimens).

SPECIMENS EXAMINED: FUKIEN: near Foochow (1 female). SZECHWAN: Chengtu (1 male), Kiating (1 unsexed). YUNNAN: Shweli-Salwin Divide (1 male).

REMARKS: A single female, with wing length of 174 mm., taken in April at Tengyueh, west-central Yunnan, is not readily placed; it might be considered intermediate between *erythrocampe* and the form of northern Burma (which occurs as near Tengyueh as Myitkyina), but nearer *erythrocampe*.

An unsexed bird, with a wing length of 170 mm., collected at Chapa, northwestern Tongking, in December, likewise seems to be intermediate between *erythrocampe* and the race of the Indo-Chinese countries, but somewhat nearer the latter.

The type of *Lempijijs erythrocampe* has, through the cooperation of the authorities of the Norwich Museum, been recently examined by Jean Delacour, who found it to agree in all essential characters with other specimens of *Otus bakkamoena* from southern China.

5. *Otus bakkamoena glabripes* (Swinhoe)

Ephialtes glabripes Swinhoe, Ann. and Mag. Nat. Hist., (ser. 4) 6: 152, Aug., 1870 (South China and Formosa; type locality here restricted to Formosa).

Toes bare.

This form has the upper parts a dark gray-brown, with the black markings inconspicuous.

WING LENGTH: 180-188 mm. (3 specimens).

SPECIMENS EXAMINED: FORMOSA: Tai-peh-fu (1 female), Bankoro (1 female), Sankocho (1 female).

6. *Otus bakkamoena umbratilis* (Swinhoe)

E[phialtes]. umbratilis Swinhoe, Ibis (new ser.) 6: 342, footnote, July, 1870 (Hainan Island, South China Sea off southern China).

Toes bare.

Similar to *O. b. glabripes*, but apparently smaller, and with the gray-

brown upper parts somewhat lighter and the black markings accordingly rather more distinct.

WING LENGTH: 161-183 mm. (6 specimens).

SPECIMENS EXAMINED: HAINAN: Hoihao (2 females), Secha (1 female), Liudon (2 males), Utoshi (1 male).

7. *Otus bakkamoena lettia* (Hodgson)

[*Scops*] *Lettia* Hodgson, Asiatick Researches, 19 (pt. 1): 176, 1836 (Nepal).

Otus bakkamoena condorensis Boden Kloss, Journ. Siam. Soc., Nat. Hist. Suppl., 8 (2): 81, Nov., 1930 (Pulau Kondor, South China Sea off Cochinchine).

Toes bare.

From *O. b. erythrocampe* distinguished in series by its much paler general coloration; from *glabripes* and *umbratilis*, by the warmer color of the upper parts, which is a more buffy, much less grayish, brown.

WING LENGTH: 156-175 mm. (41 specimens).

SPECIMENS EXAMINED: "INDIA": no definite locality (1 female); SIKKIM: no definite locality (1 unsexed); BIHAR AND ORISSA: Champaran District: Bagaha (1 female); ASSAM: Cachar District: Hungrum (1 male); Lakhimpur District: Margherita (1 female); BURMA: Myitkyina District: Myitkyina (1 male); Upper Chindwin District: Hai Bum (1 female); Mandalay District: Maymyo (1 female); Rangoon Town District: Rangoon (1 female); SIAM: North: Doi Chiang Dao (1 male, 1 female), Chiang Mai (5 females), Ban Mae Khan (1 male), Doi Khnn Tan (1 female), Lampang (1 female); Central: no definite locality (1 unsexed), "Me Ping River" (1 male), Bangkok (4 males, 4 females, 1 unsexed), Ban Thap Chang (1 male), Chachoengsao (1 female); East: Ban Pak Chong (1 male); Southeast: Ko Samae San (1 male), Chanthaburi (1 male, 1 female), Khao Sa Bap (1 female); COCHINCHINE: Bienhoa Province: Trangbom (1 unsexed); ANNAM: Quangtri Province: Hué (1 male, 1 female).

REMARKS: This race possesses red, gray, and intermediate phases, and shows so much individual variation in depth of coloration, whether red or gray, that it is by no means a satisfactory one.

O. b. condorensis is just possibly a valid form restricted to Pulau Kondor, but this is made doubtful by the fact that Chasen (Handlist of Malaysian Birds, 1935: 86), presumably with the type before him, has used the name for peninsular Siamese birds. Cochinchinese examples should be not very different from the island population, and my few specimens from Cochinchine are in fact rather deeper in color than most Siamese birds, but are not separable from those of Upper

Burma and elsewhere; the race, if maintained, would have an irrational range. It appears that in any district of higher precipitation there is a tendency to nigrescence, but this is not yet sufficiently fixed anywhere to justify dividing *lettia* on the basis of material now available.

Five birds from the northern Siamese peninsula and one from the Amherst District of Tenasserim are not listed above, because they are not only consistently darker but are also rather small (wing length 151-157 mm.); it would be improper to name them, since they are probably intermediates between *lettia* and a possibly distinct race of the peninsula south of the Isthmus of Kra, no specimens of which have been examined.

8. *Otus bakkamoena kangeana* Mayr

Otus bakkamoena kangeana Mayr, Bull. Raffles Mus., 14: 14, Sept., 1938 (Kangean Island, Java Sea).

Toes bare.

This seems to be the only pale Malaysian race. The two specimens seen agree perfectly in color with many Siamese examples of *O. b. lettia* but are distinguishable by their small size.

WING LENGTH: 144 and 147 mm. (2 specimens).

SPECIMENS EXAMINED: KANGEAN: Northwest (1 male), West (1 female).

9. *Otus bakkamoena cnephaeus*, new subspecies

TYPE: U. S. National Museum No. 179456, adult female, collected on the Rumpin River, southern Pahang State, Malaya, on July 22, 1902, by William L. Abbott.

DIAGNOSIS: Toes bare, as in the neighboring races.

From *O. b. lettia* (eastern Himalayas) easily separable by its small size and much more saturate coloration above and below.

From *O. b. lempiji* (Java) distinguished in series by having the general coloration of the upper parts a deep rufescent-washed brown, instead of a nigrescent gray-brown (eight adults from Malaya compared with 11 adults from Java).

WING LENGTH: 144-155 mm. (6 specimens).

SPECIMENS EXAMINED: "MALAY PENINSULA": no definite locality (1 male, 2 unsexed); PAHANG: Gunong Tahan (1 male), Rumpin River (1 male, 1 female); SELANGOR: Kuala Lumpur (1 male); NEGRI SEMBILAN: Bukit Tangga (1 male).

REMARKS: A single specimen from Singapore Island belongs with the following race.

10. *Otus bakkamoena hypnodes*, new subspecies

TYPE: U. S. National Museum No. 181065, adult male, collected on Pulau Padang, an island off the mouth of the Siak River, eastern Sumatra, on March 25, 1906, by William L. Abbott.

DIAGNOSIS: Toes bare, as in the neighboring races.

Nearest *O. b. cnephaeus* (Malaya), but separable in series by having the general coloration of the upper parts darker, less rufescent, and the black markings accordingly less conspicuous (10 adults from northern Sumatra and Singapore Island compared with eight adults from Malaya).

From *O. b. lempiji* (Java) distinguishable in series by having the upper parts a deep brown, slightly washed with rufescent, instead of a nigrescent gray-brown (10 adults from northern Sumatra and Singapore Island compared with 11 adults from Java).

WING LENGTH: 142–159 mm. (10 specimens).

SPECIMENS EXAMINED: SINGAPORE: Tanjong Kalong (1 male); SUMATRA: North: Pulau Padang (1 male), Mount Korinchi (1 female), Blangkedjeren (2 males), near Deli (3 males, 2 females).

REMARKS: So far as I have been able to learn, the only names possibly applicable to the Sumatran race are *Strix noctula* Temminck (Java, Sumatra, and Banda) and *Scops javanicus* Lesson (Java and Sumatra). Both have for so long been considered synonyms of *lempiji*, that it seems best to continue to treat them thus, especially since the authors probably saw only birds from southern Sumatra, where *lempiji* is quite likely to occur.

11. *Otus bakkamoena mentawi* Chasen and Boden Kloss

Otus bakkamoena mentawi Chasen and Boden Kloss, Ibis, (ser. 12) 2 (2): 279, Apr. 14, 1926 (Sipora Island, Barussan Islands, eastern Indian Ocean off Sumatra).

Toes bare.

The only adult seen has the general coloration of the upper parts ferruginous brown, with the black markings indistinct, and the under parts ferruginous with bold black streaks. A subadult specimen differs only in having the upper parts ferruginous, of the same shade as the under parts.

WING LENGTH: 157–165.5 mm. (5 specimens, *vide* Ripley, Bull. Mus. Comp. Zool., 94: 349, 1944).

SPECIMENS EXAMINED: BARUSSAN ISLANDS: Siberut Island (1 male, 1 female).

REMARKS: The adult has the upper parts indistinguishable from

those of one of the two specimens from Great Natuna mentioned below under the Bornean race.

12. *Otus bakkamoena* subsp.

Toes bare.

A series of seven adults from Borneo, north, south, east, and west, cannot be satisfactorily placed. Four are in a phase that is not distinguishable from the normal coloration of *lempiji* (Java); the remaining three have a dark rusty-red plumage quite unlike that of any other form. If three-fourths or more of the Bornean population should show this red phase, they may certainly be separated, regardless of the minority that resemble *lempiji*, but for the present I leave them unnamed.

WING LENGTH: 140-157 mm. (7 specimens).

SPECIMENS EXAMINED: BRITISH NORTH BORNEO: Mount Kinabalu (1 female), Abai (1 female), Tambunan (1 unsexed); SARAWAK: Mount Lamba (1 female); NETHERLANDS BORNEO: Kalei River (1 female), Sampang River (1 female), Sampit (1 female).

REMARKS: Hartert (Nov. Zool., 1: 481, 1894) has discussed two examples from Great Natuna (Bunguran) Island and identified them as *lempiji*, with the remark "inseparable from specimens from Malacca, Sumatra, Tenasserim, Borneo, etc."

The same two birds now lie before me; they are not like anything I have seen from Malaya, Sumatra, or Java, but are not too different from the form of Borneo, and at this time may be treated as inseparable from it, although more material might justify their being placed in a new subspecies.

13. *Otus bakkamoena fuliginosus* (Bowdler Sharpe)

Scops fuliginosa Bowdler Sharpe, Ibis, (ser. 5) 6: 197, Apr., 1888 (Puerto Princesa, Paláwan Island, Philippine Islands).

Toes bare.

The only specimen examined, a topotype, differs from red-phase examples from Borneo in having the general coloration, above and below, a slightly darker and duller, less ferruginous, brown, with the black markings of the upper parts somewhat less conspicuous.

WING LENGTH: 140 mm. (1 specimen).

SPECIMENS EXAMINED: PALÁWAN: Puerto Princesa (1 male).

14. *Otus bakkamoena whiteheadi* (Ogilvie-Grant)

Scops whiteheadi Ogilvie-Grant, Bull. Brit. Orn. Club, 4: 40, June 29, 1895 (Mountains of Lepanto Subprovince, Mountain Province, Luzón Island, Philippine Islands).

Toes bare.

REMARKS: Considered a distinct species by Peters (Check-list of Birds of World, 4: 97, 1940), *whiteheadi* is made a race of *bakkamoena* by Mayr, in Delacour and Mayr (Birds of Philippines, 115, 1946). The only specimen I have seen, a subadult, leads me to believe that the latter course is correct.

15. *Otus bakkamoena everetti* (Tweeddale)

Scops everetti Tweeddale, Proc. Zool. Soc. London for 1878, (pt. 4): 942, Apr., 1879 (Zamboanga, Zamboanga Province, Mindanao Island, Philippine Islands).

Toes bare.

REMARKS: I have not seen this bird which is treated as one of the *bakkamoena* group by Peters (Check-list of Birds of World, 4: 100, 1940) and by Mayr, in Delacour and Mayr (Birds of Philippines, 115, 1946).

16. *Otus bakkamoena boholensis* McGregor

Otus boholensis McGregor, Philippine Journ. Sci. (A. Gen. Sci.), 2 (5): 323, Oct., 1907 (Sevilla, Bohol Island, Philippine Islands).

Toes bare.

REMARKS: See remarks on *O. b. everetti* above.

17. *Otus bakkamoena lempiji* (Horsfield)

Strix Lempiji Horsfield, Trans. Linn. Soc. London, 13 (1): 140, May, 1821 (Java).

Strix noctula "Reinw." Temminck, in Temminck and Laugier, Nouveau Recueil de Planches Coloriées d'Oiseaux, 2 (livr. 17): pl. 99 and text, Dec., 1821 (Java, Sumatra, and Banda; type locality here restricted to Java).

Scops javanicus Lesson, Traité d'Ornithologie, (livr. 2): 107, May, 1830 (Java and Sumatra; type locality here restricted to Java).

Toes bare.

General coloration of the upper parts a nigrescent gray-brown, similar to that of *O. b. umbratilis* (Hainan), but darker and with the black markings accordingly less distinct.

WING LENGTH: 136-150 mm. (11 specimens).

SPECIMENS EXAMINED: JAVA: no definite locality (1 female), Batavia (1 male, 1 female), Buitenzorg (1 male, 2 females), Depok (2 males, 2 females), Mount Gedeh (1 unsexed).

18. *Otus bakkamoena bakkamoena* Pennant

Otus bakkamoena Pennant, Indian Zoology: 3, pl. 3, 1769 (Ceylon).

[*Strix*] *indica* Gmelin, *Systema Naturae*, 1 (1): 289, 1788 (Ceylon).
[*Strix*] *indica* (*Bakkamuna*) Forster, *Faunula Indica*, ed. 2: 5, 1795,
(Ceylon, *ex Pennant*).

Sc[ops] leitioides "Jerdon, MS." Blyth, *Journ. Asiat. Soc. Bengal*,
14 (1): 182, Mar., 1845 (Coromandel Coast).

Scops griseus Jerdon, *Madras Journ. Lit. Sci.*, 13 (2): 119, "Dec.
1844" = 1845 (Eastern Ghats).

[*Scops*] *malabaricus* Jerdon, *Madras Journ. Lit. Sci.*, 13 (2): 119,
"Dec. 1844" = 1845 (Near Periya Pass, Western Ghats).

Ephialtes jerdoni Walden, *Ann. Mag. Nat. Hist.*, ser. 4, 5: 417,
June, 1870 (Malabar).

Toes bare.

Very similar to *O. b. lempiji* (Java), but with the general coloration,
above and below, slightly paler, and with the black markings of upper
and under parts narrower—streaks, rather than spots or blotches.

WING LENGTH: 140–151 mm. (6 specimens).

SPECIMENS EXAMINED: CEYLON: Colombo (3 males, 2 females, 1
unsexed).

REMARKS: The birds of southern India are customarily combined
with the race of Ceylon. In the absence of suitable material, I am
assuming that this procedure is the correct one, although the three
South Indian specimens before me (two in a red phase, one in a deep
brown phase and with the wing measuring 160 mm.!) do not agree
well with the small Ceylon series.

19. *Otus bakkamoena marathæ* Ticehurst

Otus bakkamæna marathæ Ticehurst, *Bull. Brit. Orn. Club*, 42: 122,
May 5, 1922 (Raipur, Raipur District, Chhattisgarh Division, Central
Provinces, British India).

Toes bare.

REMARKS: No specimen has been examined.

20. *Otus bakkamoena gangeticus* Ticehurst

Otus bakkamæna gangeticus Ticehurst, *Bull. Brit. Orn. Club*, 42: 122,
May 5, 1922 (Fategarh, Farrukhabad District, Allahabad Division,
United Provinces, India).

Otus bakkamoena stewarti Koelz, *Proc. Biol. Soc. Wash.*, 52: 80,
June 5, 1939 (Baijnath, Kangra District, Jullundur Division, Punjab
Province, India).

Toes bare.

Larger than *O. b. bakkamoena* (Ceylon) and much paler.

WING LENGTH: 161 mm. (1 specimen).

SPECIMENS EXAMINED: UNITED PROVINCES: Fategarh (1 female).

REMARKS: I should have been inclined to give Koelz's *stewarti* the benefit of the doubt had the author not failed completely to mention *gangeticus*, the form obviously most nearly related; under the circumstances, the validity of *stewarti* must be considered unproved.

21. *Otus bakkamoena deserticolor* Ticehurst

Otus bakkamæna deserticolor Ticehurst, Bull. Brit. Orn. Club, 42: 57, Jan. 3, 1922 (Hyderabad, Hyderabad District, Sind Province, India).

[*Otus bakkamoena*] *deserticola* Koelz, Proc. Biol. Soc. Wash., 52: 80, June 5, 1939 (Sind Province, British India). *Lapsus calami* for *Otus bakkamoena deserticolor* Ticehurst!

Toes bare.

REMARKS: No specimen has been examined.

22. *Otus bakkamoena plumipes* (Hume)

Ephialtes plumipes Hume, Ibis, ser. 2, 6: 439, July, 1870 (India).

Ephialtes Plumipes Hume, My Scrap Book: or Rough Notes on Indian Oology and Ornithology, 1 (2): 387 (in key), 397, "1869" = 1870 ("near Murree, . . . Kotegurh, . . . Gurhwal"; type locality commonly restricted by authors to Murree, Rawalpindi District, Rawalpindi Division, Punjab Province, India).

Toes feathered.

WING LENGTH: 162-182 mm. (*vide* Stuart Baker, Fauna of British India, Birds, ed. 2, 4: 426, 1927).

REMARKS: So far as I can learn, no one has yet compared *plumipes* with *semitorques* (Japan), with the result that all descriptions of the former might apply equally well to the latter. Stuart Baker (*loc. cit.*) has so far ignored the forms of northeastern Asia as to say of *plumipes* that it differs from "all other races in having the feathering of the tarsi extended on to the toes"!

Two specimens from the Rothschild Collection, wholly without data, have been at some time identified as *plumipes*. One, with wing length 160 mm. (A. M. N. H. No. 629837), is inseparable above from the Shantung bird I have called *ussuriensis*, but differs from it below by having the shaft streaks much narrower and the vermiculations much finer. It is not darker than *bakkamoena* (Ceylon), as Stuart Baker says *plumipes* should be, but paler. Since only the extreme bases of the toes are feathered, it cannot be *plumipes* in which the feathering should reach the subterminal phalanges, but might represent *gangeticus*.

The second, with wing length 177 mm. (A. M. N. H. No. 629835),

is nowise distinguishable from my long series of *semitorques* and is, in my opinion, a bird of Japanese provenience.

United States National Museum, Washington, D. C., February 5, 1948.

ADDITIONAL OBSERVATIONS AND COMMENTS ON "ANTING" BY BIRDS

BY HORACE GROSKIN

ORNITHOLOGISTS in America and in several other countries have recently become greatly interested in the strange behavior of birds known as "anting." When a bird "ants," it seizes an ant and usually rubs it under the wings and often at the base of the tail or, as some observers have reported, holds the ant somewhere in its feathers for some unknown purpose. Many theories have been advanced as to why birds do this, but up to the present time no one has discovered the reason, and "anting" still remains a mystery.

W. L. McAtee (1938) summarized nearly all the recorded observations and inferences to that date, and since then many additional observations of "anting" have been recorded in various countries throughout the world. Some ornithologists were rather sceptical about the reports of this peculiar bird behavior and they remained doubtful until they actually observed it for themselves. "Anting" by birds is thought to be a rather rare occurrence but, in the opinion of the writer, it is not as rare as it appears to be and is quite often mistaken for preening; it is, therefore, overlooked until the observer becomes aware of the fact that the bird is behaving in an unusual manner, different from ordinary preening, and is picking up something from the ground and applying it to the feathers.

Some of the theories advanced as to the reasons for birds "anting" are as follows: (1) birds place ants in their feathers to get rid of ectoparasites; (2) birds use the ants to annoint themselves with the formic acid excretions of the ant to give tone to the muscles and also for the general agreeable effect; (3) birds rub ants on their feathers to wipe off the formic acid before eating them, as a means of ridding themselves of endoparasites; (4) birds place ants under their wings as a reserve food supply during migrations. This inference seems rather far-fetched, but an observation recorded by Charles T. Ramsden (1914) of birds carrying snails under their wings during migration requires that we give this theory further consideration and investigation.

I made my first observation of "anting" on October 2, 1941, at

Ardmore, Pennsylvania. At that time, I observed two Scarlet Tanagers, *Piranga olivacea*, "anting" with virgin queens of the ant, *Lasius (Acanthomyops) claviger* (Roger), recorded in 'The Auk' (60: 55-59, 1943). Since then I have made 11 additional observations at Ardmore of "anting" by five species of birds with four different species of ants.

On September 14, 1943, two Scarlet Tanagers were again observed "anting" at Ardmore at exactly the same location and with the same colony of ants that was observed two years before. The "anting" behavior of these was decidedly different. In 1941, the tanagers "anted" very deliberately, while the tanagers in 1943 appeared very nervous and excited, "anting" rapidly at intervals, which probably was due to the fact that, unintentionally, I came upon them suddenly, stopping within three feet of them. They, however, continued to "ant" for a period of 15 minutes before flying away. The incentive for the birds to continue "anting," under the circumstances, must have been powerful.

On June 1 and again on June 27, 1944, two Catbirds, *Dumetella carolinensis*, "anted" with the workers of the ant, *Formica fusca subsericea* (Say). The catbird of June 1 crouched very low over the nest entrances of the ants, appearing to allow the ants to crawl over it; from time to time it would seize an ant and rub it under the primaries and at the base of the tail. While banding Catbirds, I have often noted that when Catbirds first arrive in Ardmore during the spring migration, they usually have many bird lice, *Mallophaga*, that come running out of their feathers over my hand; this may be the reason they permit the ants to crawl over and into their feathers. On August 29, 1945, another Catbird "anted" with virgin queens and males of the ant, *Lasius niger* var. *neoniger* (Emery).

On October 5, 1944, an Eastern Robin, *Turdus migratorius*, "anted" with the virgin queens of the ant, *Lasius (Acanthomyops) claviger* (Roger). This bird tumbled completely over several times while attempting to rub the ant on the under tail-coverts. On May 14, 1947, a Wood Thrush, *Hylocichla mustelina*, soon after its arrival from its winter quarters, "anted" with the workers of the ant, *Formica fusca* var. *subsericea* (Say). A Catbird made several attempts to drive the Wood Thrush away from the ants, but it returned each time and finally held its ground and "anted" slowly, deliberately and without excitement.

On August 30, 1945, an Eastern Song Sparrow, *Melospiza melodia*, "anted" with virgin queens of *Lasius niger* var. *neoniger* (Emery). On July 20 and August 7, 14, 18, and 19, 1948, five additional observa-

tions were made of Song Sparrows "anting" with the workers of *Formica sanguinea subintegra* (Emery). It is probable that in the five "anting" observations of Song Sparrows, only two Song Sparrows were involved, and since these two were banded birds and no other Song Sparrows without bands were observed "anting," it is almost certain that it was the same two banded Song Sparrows that performed in each of the five observations. It is interesting to note that these Song Sparrows continued to "ant" repeatedly on five days between July 20 and August 19, often several times on the same day, and perhaps many more times when the observer was not present. It was not possible to determine how many times throughout the entire period each individual bird "anted," since the birds could not be trapped immediately after "anting" to read the band numbers. On August 14, 1948, both banded Song Sparrows "anted" at the same time within 35 feet of each other, seizing ants from the same file of ants travelling on an expedition.

The "anting" behavior pattern of the Song Sparrows in 1948 was entirely different from the "anting" behavior pattern of the Song Sparrow in 1945. The bird in 1945 "anted" in the usual manner by rubbing the ant under the primaries and under tail-coverts very deliberately without excitement, whereas in 1948 the Song Sparrows' performance was so peculiar that it probably would be of interest to describe it in detail.

From about the middle of July to the latter part of August, the workers of the ant, *Formica sanguinea subintegra*, known as the "Blood-red Slave-makers," make raids on other species of ants, particularly the common black ant, *Formica fusca* var. *subsericea*, and carry off the young to their own nests where the young are raised to become slaves. When the slave-makers go forth to make a raid, they usually travel in a file along a narrow route from 12 to 18 inches wide, extending in length anywhere from 50 to 300 feet from their own nest to the nest to be raided. When these ants are on a raiding expedition there are often as many as 300 to 500 slave-makers in the file. During the past several years, I have had an unusual opportunity to observe and study these raids and have become fairly well acquainted with this ant's behavior.

We have two large colonies of these slave-makers on our property at Ardmore, as well as five large colonies of the ant, *Formica fusca* var. *subsericea*, which is the species usually enslaved by the slave-makers. On July 20, 1948, I observed a long file of the "Blood-red Slave-makers" in the short grass, close to the house, on their way to make a raid. While observing the ants, a banded Song Sparrow arrived and sta-

tioned itself alongside the file of ants, and immediately started "anting" with the slave-makers by seizing one of the ants from the file; it rapidly rubbed the ant under the primaries of the right wing and then changed over to the left wing, where it rubbed the ant between the primary feathers with a few strokes; it then straightened up. In a few seconds, the Song Sparrow seized another slave-maker from the file and started rubbing it under the tail-coverts, but apparently it was not reaching the desired spot, so it brought its tail forward under the body and actually sat down on its tail and proceeded to rub the ant on the underside of the tail which was then upside down. Suddenly, the bird sprang to its feet and began shaking itself vigorously, dancing around in a half circle, and also jumping up and down; from time to time it picked at its legs and breast feathers. The entire performance continued for about two minutes, when the bird gradually quieted down and, much to my surprise, started "anting" again and going through the same performance which lasted for about ten minutes. Then the bird flew away. The reason for this unusual "anting" behavior of the Song Sparrow was perhaps due to the fact that when the Song Sparrow started seizing these slave-making ants, the fellow workers of the slave-makers immediately attacked the bird.

It is evident from the "anting" behavior of the Song Sparrow, as described above, that there is considerable variation in "anting" behavior, depending on the particular species of ant that is used by the bird in "anting," and perhaps also on the various castes of ants belonging to the same species and even to the same colony.

The Song Sparrow in 1945 "anted" with virgin queens of *Lasius niger* var. *neoniger*, and these queens submitted to capture without difficulty, while the Song Sparrows in 1948 "anted" with the worker caste of the slave-makers, *Formica sanguinea subintegra*, and the bird was attacked, which resulted in a considerable difference in the "anting" behavior of the bird. It is also possible that the same bird may "ant" for a particular purpose at one time and for an entirely different reason at another time. On one occasion the bird may rub the ant on its feathers to rid itself of ectoparasites, and on another occasion it may not rub the ant at all but hold the ant in its feathers so that the ant may spray formic acid and thus keep the ectoparasites out of its feathers.

Up to the present time, hardly any attention has been given to the identification of the ants used in "anting," and we know almost nothing about the excretions of the ants. Many ornithologists have assumed that the birds "ant" to get the benefits of formic acid and have taken for granted that all ants excrete formic acid. For example, O. Hein-

TABLE 1

SPECIES OF BIRDS AND THE ANTS USED IN "ANTING"

Seven Eastern Robins, *Turdus m. migratorius*, "anted" with the following six species of ants.

- Tapinoma sessile* (Say)
- Lasius umbratus mixtus aphidicola* (Walsh)
- Lasius* (*Acanthomyops claviger*) (Roger)
- Formica fusca* var. *sanbanescens* (Emery)
- Formica fusca* var. *subsericea* (Say)
- Formica exsectoides exsectoides* (Forel)

Five Catbirds, *Dumetella carolinensis*, "anted" with the three species of ants.

- Lasius niger* var. *neoniger* (Emery)
- Lasius umbratus mixtus aphidicola* (Walsh)
- Formica fusca* var. *subsericea* (Say)

Four Starlings, *Sturnus v. vulgaris*, "anted" with four species of ants.

- Camponotus consobrinus*
- Lasius niger* var. *neoniger* (Emery)
- Lasius* (*Acanthomyops*) *interjectus* (Mayr)
- Formica fusca* var. *subsericea* (Say)

Three Eastern Song Sparrows, *Melospiza m. melodia*, "anted" with three species of ants.

- Lasius niger* var. *neoniger* (Emery)
- Formica rufa* (Linnaeus)
- Formica sanguinea subintegra* (Emery)

Three Purple Grackles, *Quiscalus q. quiscula*, "anted" with three species of ants.

- Lasius niger* var. *neoniger* (Emery)
- Lasius umbratus mixtus aphidicola* (Walsh)
- Lasius* (*Acanthomyops*) *murphyi* (Forel)

Two Red-eyed Towhees, *Pipilo e. erythrophthalmus*, "anted" with two species of ants.

- Tapinoma sessile* (Say)
- Lasius niger* var. *americanus* (Emery)

Two Scarlet Tanagers, *Piranga olivacea*, "anted" with one species of ant.

- Lasius* (*Acanthomyops*) *claviger* (Roger)

One Cowbird, *Molothrus ater*, "anted" with two species of ants.

- Lasius niger* (Emery)
- Formica* sp.

One Western Crow, *Corvus brachyrhynchos hesperis*, "anted" with one species of ant.

- Formica rufa obscuripes* (Forel)

One Hooded Crow, *Corvus c. cornix*, "anted" with one species of ant.

- Formica rufa* (Linnaeus)

One Lewin Honeyeater, *Meliphaga*, "anted" with one species of ant.

- Camponotus* sp.

One Buff-throated Saltator, *Saltator maximus*, Sharp-billed Flycatcher, *Pipromorpha oleaginea*, and Barred Woodhewer, *Dendrocolaptes certhia*, "anted" with one species of ant.

- Camponotus senex textor*

roth (1911 a.) wrote that, "Birds probably find formic acid is useful in expelling vermin." Alfred Troschutz (1931), writing about "anting," said, "A peculiarity which certain exotic birds and the Redwing Thrush have in common is the use of living ants for anointing their legs, rump and wings. The formic acid must have an especially agreeable effect." Funke (1912) referring to a Magpie, *Pica p. pica*, and Starling, *Sturnus v. vulgaris*, "anting," stated that he "believes that the 'anting' by these birds is for the practical objective of driving out annoying vermin by means of formic acid." H. Heine (1929), who observed hooded crows, *Corvus c. cornix*, dusting themselves in a colony of *Formica rufa*, wrote, that "the Hooded Crows sprinkled themselves with formic acid to rid themselves of parasites." Salim Ali (1936) who was also very much interested in "anting" remarked that, "Formic acid is used in human medication to give tone to the muscles, increase muscular energy and abolish the sense of fatigue and may similarly be useful to birds or possibly also in expelling endo-parasites." K. Floericke (1911), reference from Gerber, 1935, said, "The birds were also seen to use the beak in placing ants under their feathers where the action of formic acid would be effective." The writer, H. Groskin (1943), suggested the possibility that "the bird held the ant at particular places among its feathers where its skin had been irritated by ecto-parasites. The ant being disturbed by being held in the bird's bill would cause it to spray formic acid on the irritated skin, which might be beneficial to the bird's skin as a counter-irritant." The use of formic acid as a counter-irritant has been well-known to the medical profession for several hundreds of years.

Many species of ants no doubt do spray formic acid. Neal A. Weber (1935), a myrmecologist, made an "anting" observation and identified the ant as *Formica rufa obscuripes* (Forel), stating that these ants spray formic acid. He described the observation as follows: "The peculiar behavior of two pet Crows indicated an unexpected factor which may, perhaps, be of some importance. These Crows, entirely normal in every respect and able to fly as well as any wild ones, several times flew to the nest while I was observing the general activity. They stood upon it, fluffed out their feathers, squatted in the manner of birds taking a dust bath, and deliberately allowed the ants to crawl over them. The workers swarmed in large numbers over and through their fluffed out feathers, spraying formic acid liberally. After a few moments, when covered with ants, they hopped off the mound and shook themselves vigorously. The ants still clinging to the feathers were picked off and thrown aside. None were eaten. It seems to me that the Crows might have acted in this

manner to disinfect themselves: the formic acid sprayed by the ants might repel ecto-parasites of the Crows."

Marion R. Smith (1947) of the United States National Museum, Division of Insect Identification, states that "the ants of the genus *Lasius* (subgenus *Lasius*) *niger alienus americanus* (Emery), *niger* var. *neoniger* (Emery), and *niger* var. *sitkaensis* (Pergande) are capable of emitting a strong formic acid odor." However, the general assumption, as indicated in the foregoing references, that almost all ants spray formic acid is certainly invalid.

William M. Wheeler (1910) wrote, "Apart from a recent paper by Melander and Brues (1906), little has been published on the chemical constitution of the poisons of ants in general. These authors find appreciable traces of formic acid, as a rule, only in *Camponotinae*." Wheeler (1910), however, referring to the genus *Formica* stated that "many species of this genus of ants spray their enemies with formic acid." Whether some of the other sub-families and genera of ants excrete formic acid is certainly open to question. The ants of the genus *Lasius* (*Acanthomyops*) have a strong pungent odor similar to lemon geranium or oil of citronella. This odor is very noticeable if one happens to be near a colony of these ants when they are swarming. The ants of the genus *Tapinoma* have a nauseating odor of rotten coconuts. Wheeler (1910) states that "In the *Doryline* ants (various species of *Eciton*) the secretion has a very strong and nauseating fecal odor like that of Lace-wings (*Chrysopa*)." Probably none of these ants excrete formic acid. Stumper (1922, 1923), who investigated the venom of some ants, reported that several species of the sub-family *Camponotinae* produce only formic acid, while several species of sub-families *Myrmicinae* and *Dolichoderinae* produce no formic acid. Instead, the venom appears to consist of proteins. We find, according to the recorded "anting" observations, several birds are recorded "anting" with ants not known to excrete formic acid. Van Tyne (1943) reported that a Robin, *Turdus m. migratorius*, and a Towhee, *Pipilo e. erythrophthalmus*, "anted" with a *Tapinoma* ant. H. R. Ivor (1943) reported numerous species of birds "anting" with *Tapinoma* species. H. Groskin (1943) and M. David (1944) reported Robins "anting" with *Lasius* (*Acanthomyops*) *claviger*, while Kalmbach (1938) stated that the Starling "anted" with *Lasius* (*Acanthomyops*) *interjectus*, and H. Brackbill (1948) observed a Purple Grackle, *Quiscalus q. quiscula*, "anting" with *Lasius* (*Acanthomyops*) *murphyi*. All of these ants belonging to the subgenus *Acanthomyops* are said to excrete citric acid and not formic acid.

It is evident that we do not have enough information about ants

TABLE 2
SOME IDENTIFIED ANTS USED BY BIRDS IN "ANTING"

ANTS	BIRDS	OBSERVERS
<i>Tapinoma sessile</i> (Say)	Robin and Towhee	Joselyn Van Tyne, 1943.
<i>Camponotus</i> sp.	Lewin Honeyeater	P. A. Bourke, 1941.
<i>Camponotus consobrinus</i>	Starling	A. H. Chisholm, 1944.
<i>Camponotus senex texior</i> (F. Smith)	Buff-throated Saltator, Barred Woodhewer, Sharp- billed Flycatcher	A. F. Skutch, 1948.
<i>Lasius niger</i> var. <i>americanus</i> (Emery)	Red-eyed Towhee	W. L. McAtee, 1944.
<i>Lasius niger</i> var. <i>neoniger</i> (Emery)	Purple Grackle, Catbird, Starling	H. Brackbill, 1948.
<i>Lasius niger</i> var. <i>neoniger</i> (Emery)	Song Sparrow, Catbird,	H. Groskin
<i>Lasius niger</i>	Cowbird	M. M. Nice, 1945.
<i>Lasius umbratus mixtus aphidicola</i> (Walsh)	Purple Grackle, Robin, Catbird	H. Brackbill, 1948.
<i>Lasius (Acanthomyops) interjectus</i> (Mayr)	Starling	McAtee, Kalmbach, 1938.
<i>Lasius (Acanthomyops) claviger</i> (Roger)	Scarlet Tanager	H. Groskin, 1943.
<i>Lasius (Acanthomyops) claviger</i> (Roger)	Scarlet Tanager, Robin	H. Groskin
<i>Lasius (Acanthomyops) claviger</i> (Roger)	Robin	M. David, 1944.
<i>Lasius (Acanthomyops) murphyi</i> (Forel)	Purple Grackle	H. Brackbill, 1948.
<i>Formica</i> sp.	Cowbird	M. M. Nice, 1945.
<i>Formica fusca</i> var. <i>subaenescens</i> (Emery)	Robin	C. H. Nichols, 1943.
<i>Formica fusca</i> var. <i>subsericea</i> (Say)	Wood Thrush, Catbird	H. Groskin
<i>Formica fusca</i> var. <i>subsericea</i> (Say)	Starling, Catbird, Robin	H. Brackbill, 1948.
<i>Formica rufa</i>	Song Sparrow	Nice and Feiwkyk, 1940.
<i>Formica rufa obscuripes</i> (Forel)	Western Crow	Neal A. Weber, 1935.
<i>Formica rufa</i> (Linnaeus)	Hooded Crow	H. Heine, 1929.
<i>Formica exsectoides exsectoides</i> (Forel)	Robin	A. E. Staebler, 1942.
<i>Formica sanguinea subintegra</i> (Emery)	Song Sparrow	H. Groskin
<i>Tapinoma</i> sp.		
<i>Camponotus pennsylvanicus</i> (Degeer)	31 species	H. R. Ivor, 1943.
<i>Lasius niger</i> (Emery)		
<i>Formica sanguinea</i> (Latreille)		

and their excretions to solve the problem of why birds "ant." It is suggested that observers of "anting" collect some specimens of the ants immediately after the bird finishes "anting" and have these ants identified and also, if possible, secure from a chemist an analysis of the chemical composition of the excretion of the ant and have this recorded, which no doubt would contribute greatly in solving the "anting" problem.

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Glenn Road, Ardmore, Pennsylvania, May 5, 1949.

OBSERVATIONS ON SOCIAL BEHAVIOR IN
TURKEY VULTURES

BY HOWARD H. VOGEL, JR.

ON May 30, 1947, an adult Turkey Vulture, *Cathartes aura*, was found inside the hollow base of a tall sycamore tree, in a densely wooded area near Crawfordsville, Montgomery County, Indiana. Students reported that they had found vultures nesting in this same tree in previous years.

The opening into the hollow tree, being less than five feet above the ground, was convenient for observations of the birds within the tree. Sufficient light came in from above so that the actions of the birds in the nest could be seen clearly. The floor of the nesting area was approximately circular, and about five feet in diameter. No nesting materials were evident; the site was covered mainly with humus and decaying wood.

Death-feigning: When the first observations were made, an adult bird was in the tree with two white downy chicks, a few days old, nestling under its body. The most striking behavior on the part of the adult bird, when disturbed in its nest, was a complete lack of activity, either vocal or muscular. The adult seemed to "freeze" in its position for several minutes and, to superficial observation, appeared dead. The bird lay flat on its abdomen, wings spread out, head down, with no bodily movement. During this time, although the young birds were often quite noisy, the adult never made an audible sound. Although the bird was prodded with a stick from above, and several times actually lifted off the ground, the death feint persisted; only occasional movements of the eyes were seen.

Vocalization: The young birds were noisy. Within a week after hatching they were producing an indrawn hissing sound whenever disturbed. At this age the young would respond to similar inhalant noises made by the observer outside the tree.

Feeding: During an early visit to the nest the feeding of the young was observed. The adult regurgitated food directly onto the floor of the nesting area. The dark semi-liquid material was strongly odoriferous. One of the young birds ate from the ground, the other directly from the bill of the adult bird which was kept open during this period. The young bird thrust its bare head into the mouth of its parent and seemed to work hard on the lower mandible. After feeding there was some pecking between the two young birds, although it did not seem aggressive to the observer, merely a part of the feeding activity. The

downy white birds were usually seen in a relatively clean condition, although their habits of feeding and of defensive regurgitation must soil the plumage constantly.

When first removed from the nest at about two weeks of age, both young birds regurgitated. However, they did not completely empty their bulging crops. The regurgitated food, covering the ground near the nest, produced a strong stench which attracted hundreds of flies within a very short time. The insects fed on this food during that entire afternoon. Although the flies were abundant outside the tree, they were rarely seen within the nest cavity. There was a characteristic odor to the nest, yet the interior of the hole was almost always clean.

Behavior of the young when handled: The most obvious and constant reaction to any disturbing stimulus was the inhalant hissing sound of these young vultures. Although the birds soon seemed to adapt themselves to removal by means of an insect net, they hissed every time they were picked up. When in the nest, they also responded to any external noise by raising their heads and hissing. In contrast, the adult birds in the tree were never heard hissing. By the time the young vultures were five weeks of age the inhalant hissing was more vigorous. It often resembled a type of human snoring; the noise constantly rose in pitch and lasted for at least five or six seconds, being repeated frequently if the young were alarmed. Defecation was a second reaction to being handled, although this was not frequently observed.

Development of locomotion: At two weeks of age the birds could walk on the ground but had obvious difficulties getting around. They used their wings for balance. At approximately five weeks of age the young vultures were about the size of large chickens, with a wing-spread of three to four feet. Their bodies were still predominantly white, although black feathers were appearing on wings and tail. At this age the birds could walk well on the ground. When lifted in the net much pecking was attempted. By the next week the vultures were running well. When the birds were almost seven weeks old, they showed themselves to be excellent climbers. In the vicinity of the nesting tree there was a small stream with a steep sand bank on the far side, rising almost perpendicularly to a height of 20 or 30 feet. One of the vultures, trying to escape capture, crossed this stream which was almost dry and climbed straight up the sandy cliff with little apparent difficulty. The ascent at this point was so difficult that the observer had to climb the hill at a gentler slope and was fortunate in being able to locate the bird at the top by its omnipresent hissing.

When the bird was climbing it used its feet, wings, and bill most effectively in the sand of the slope. The huge wings were used for balance while walking and running.

Defenses of young vultures: The young turkey vultures were never observed to feign death as was the adult bird. If removed from the nest and placed upon the ground, the young birds usually tried to run away. There was a decided tendency to hide in dark places and to get under bushes and shrubs. One vulture even squirmed into a slight depression under a rock in an attempted escape.

As the birds became older, aggressiveness developed. They pecked at the net in which they were carried and attempted to peck the observer more frequently than heretofore.

If one of the birds was cornered on the ground, it would stand facing the observer, stretching out its wings to full extent, lowering its head, hissing continually, and regurgitating occasionally. This latter phenomenon was observed less frequently as the birds were handled more often.

DISCUSSION

(1) *The problem of the death feint:* The problem of feigning death is all the more interesting because of its widespread occurrence among animals. Mills (1898: 64) writes that the habit has been observed in many different genera of insects, in snakes, fishes, numerous birds, crustaceans, and several mammals. Romanes (1885: 303) also describes a death feint in spiders, crabs, and cattle. Charles Darwin in an 'Essay on Instinct,' published posthumously in Romanes' book, writes: "Insects are most notorious in this respect" (shamming death).

The author recalls young Piping Plovers, *Charadrius melodus*, and Least Terns, *Sterna albifrons*, feigning death on the beaches of Long Island, New York. Holmes (1911: 96), describing young terns, states that

"the instinct of feigning death which does not occur in the young fledgling now appears on the scene; the young birds will allow themselves to be handled and pulled about without betraying a sign of life and will even suffer their tail or wing feathers to be pulled out one by one without a wince. After a time, as if the bird recognized the futility of the ruse, the death feint is discontinued with a surprising suddenness to be followed by violent struggles, screams and pecking at its captor in its efforts to make its escape. Later, when the birds are able to fly, the crouching and death feigning instincts disappear."

Watson and Lashley (1908), studying the homing instinct in Noddy, *Anous stolidus*, and Sooty Terns, *Sterna fuscata*, at Tortugas Station, described how upon approach the young chicks shammed death until they were touched, whereupon they took to their legs and ran off.

There do not seem to be many descriptive references in the literature to this habit in Turkey Vultures. Coues (1927: 704) writes, "The turkey vulture has a curious habit of 'playing possum' by simulating death when wounded and captured, the feint is admirably executed and often long protracted." Forbush (1927: 91) writes that, "When wounded or entrapped the turkey vulture has two means of defense. It ejects at the enemy the putrid contents of its gullet, and if this is not enough, the bird can 'play possum,' apparently dying. Thus, it simulates the dead in hope, perhaps, of deluding its captor."

The clearest description of this peculiar behavior in the turkey vulture is found in Prentiss (1882: 721) in a discussion of hypnotism in animals,

"In the year 1859, when enthusiastically interested in ornithology, I shot a turkey buzzard (*Cathartes aura*). The bird was winged, and when approached was standing up under a laurel bush, looking brightly about, one wing hanging. As I came up, he first disgorged, then as I continued to approach, his head began to droop to one side, and by the time I reached him he lay upon his side apparently lifeless. Believing that he really was dead, I with difficulty forced him into my game bag and proceeded home, a distance of two miles. He was then taken from the game bag and thrown down in the yard, limp and lifeless.

My surprise can be imagined when calling out the family to view the capture a minute later, he was found running around the yard lively as ever. On our approach, however, the same motions were enacted, and again he lay upon his side dead. This routine followed each approach, until after awhile he became accustomed to the presence of persons, and then would simply hiss and disgorge."

The feigning habit seems to be found in other members of the vulture group. Lacey (1911: 207) describes the young of the Black Vulture, *Coragyps atratus*, characteristically feigning death when disturbed. He also states that he saw an old bird of this species, with the tip of its wing broken, go through the same act.

The death feint has been explained as an effect analogous to catalepsy in which the senses are stupefied by terror and surprise so that the animal is unable to escape. This might be termed the theory of the transfixing effect of fear. It is found described in many accounts of animal hypnotism.

Loeser (1940: 30), writing on this type of animal behavior, states,

"It appears also that the semblance of death as a protection is produced in various ways. Sometimes it is evidently not a calculated action, but simply due to a kind of fainting-fit or stunned condition, as has been observed in birds and mice. With foxes and other intelligent animals, on the other hand, it seems to be a matter of real calculation; but even here the animal seems to know to a certain extent that if it keeps quiet it will not be attacked.—The sole aim of feigning death is immobility; the idea of death and its significance is certainly not present and also not necessary.

The biological aim of this action is not always achieved, as it rarely offers sufficient protection against predatory enemies."

There has been reported a gradual diminution of the duration of the death feint due to fatigue of the motor apparatus. The attitude in this type of response is one of muscular rigidity which would naturally involve fatigue. It is of interest that in lower forms the death feint wears itself out slowly, while in higher animals feigning is carried out only a few times before the animal refuses to feign longer. Here, the factor of intelligence may come into play.

In the Turkey Vulture, death feigning seems to depend, at least in part, upon the type of nesting environment. Kempton (1927: 142), describing a Turkey Vulture nesting in a hollow tree in Wayne County, Indiana, did not report any death feints. He was able to handle the adult bird during incubation. Coles (1944: 219), reporting on nesting of these birds in Ohio caves, does not mention the death feint. In most of the cases he described, the cave had two openings which could serve as exits for any trapped birds. Maslowski (1934: 229) found a Turkey Vulture's nest located some 40 feet up in the cavity of a live beech tree in Clermont County, Ohio. He states that "The bird was exceedingly tame and permitted itself to be stroked and lifted from the eggs in much the same fashion as an old hen. On later visits this procedure was repeated except that the vulture began to protest over our excessive handling by its usual method of defense—vomiting. Only on one occasion did the bird leave the nest without our first removing it." A personal communication from an ornithologist in Indiana who has trapped many adult vultures reports no death-feigning in these birds when confined in large traps.

Clearly, then, there are not only differences in individual reactions to intrusion, but the character of the nesting site and the ability of the adult bird to escape, are factors that must be considered in the problem of death feigning. Wild geese of Siberia, if alarmed during the moulting season when they are unable to fly, have been reported to stretch themselves at length upon the ground with their heads concealed.

J. P. Scott (1946: 379), working on the reactions of mice to restrictions of space, has shown that the mice first try to escape by running away. If this is impossible, they then go through a characteristic defensive stance, and finally become quite immobile, seeming to freeze and often lying helplessly on their backs with their feet up in the air. In analogous fashion, it seems to the author that the death feint observed in this particular nesting site was due, in part at least, to the fact that the only possible exit for the bird was blocked by the intruder.

The fact that other observers have not reported death-feigning when the vultures could easily get away and that the young did not go through this immobility reaction, seem to confirm this hypothesis of space restriction, which can and should be tested experimentally.

(2) *Social behavior*: In this paper social behavior will be defined as any type of behavior by which one individual of a given species affects another individual of this species. This would eliminate from consideration interspecific social behavior, as reported by Vogel (1945: 551).

Using the eight types of social behavior suggested by Scott (1945) in his study of sheep, we can classify some of the types of behavior reported in the descriptive portion of this article.

- A. *Epimeletic behavior* (Care of the young by the parents)
 - 1. Feeding young by regurgitating food.
 - 2. Keeping young birds and nesting area clean.
- B. *Et-epimeletic behavior* (Calling for help by young)
 - 1. Vocalization by young, especially when hungry.
 - 2. Young pecking at bill of adult.
 - 3. Open mouth reflexes.
- C. *Sexual behavior*
 - None observed.
- D. *Allelomimetic behavior* (Mutual imitation)
 - 1. Inhalant hissing by one bird evokes same response from other.
 - 2. Mouth opening seems to be imitation in pair of young.
- E. *Aggressive and defensive behavior*
 - 1. Pecking behavior.
 - 2. Regurgitation of food by both young and adults.
 - 3. Death feint.
 - 4. Inhalant hissing.
- F. *Shelter-seeking* (May be considered social behavior only in certain cases)
 - 1. Types of nesting sites selected.
 - 2. Retreat of young to dark, inaccessible places.
- G. *Feeding*
 - 1. Must be considered social behavior in these birds.
- H. *Aggregation*
 - 1. Bodily contact of young with each other in nesting site.
 - 2. Adults covering young during cold.

GENERAL CONCLUSIONS

The problem of death feigning seems to the author only one part of the larger problem of why different birds, especially when incubating

or with young, react to intruders in such variable ways. There seems to be little in common, superficially, between the death feint here described for the vulture, the inactive placidity of a broody hen, the diving attack of an Osprey, *Pandion haliaetus*, or the rigid, snake-like, neck thrust of a Canada Goose, *Branta canadensis*; all are reactions to disturbances at the nest. It is certain, however, that we are dealing here with several factors and that there are complex causes to these various behavior traits.

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University of Chicago, Chicago, Illinois, April 8, 1948.





NESTS OF SURINAM BIRDS. (Top left) *Collumbicallina minuta*, NEAR PARAMARIBO, NOV. 8, 1946; (Top right) *Elaenia cristata*, ZANDERIJ, APRIL 24, 1949; (Lower left) *Tolmomyias flaviventris*, NEAR PARAMARIBO, JUNE 15, 1947; (Lower right) *Empidonax varius*, ZANDERIJ, DECEMBER 12, 1948.

BIRD RECORDS FROM SURINAM, DUTCH GUIANA

BY FR. HAVERSCHMIDT

IN the following list I give some records of birds obtained or observed by me during the last years in Surinam. I have to thank Dr. J. T. Zimmer of the American Museum of Natural History, New York, who named several of them for me.

Micrastur mirandollei.—Schlegel (1862) described this species from Surinam, but did not mention any locality. As this bird is so rare in collections (Swann, 1925), it may be of interest to report that I received a female, collected June 11, 1947, on the coffee plantation "Peperpot," a few miles up the Surinam River from Paramaribo (Collector's no. 271, now in the American Museum of Natural History, New York).

Helicolestes hamatus.—I have several observations of this little known hawk which I only saw in part of the year, my dates ranging from October 20 to April 13. The seven specimens in the collection assembled for Thomas E. Penard (Bangs and Penard, 1918) were obtained from December to March. Besides in the neighborhood of Paramaribo, I observed this species along the Saramacca River near Groningen (March 5, 1947) and along the road from the Coppename River to Coronie (March 25, 1947).

My four specimens—female, November 24, 1946; female, December 26, 1946; ? March 8, 1947, and male, April 13, 1947—were collected at "Peperpot." It is a solitary bird, usually found sitting motionless on a tree near a watercourse watching for snails. On the coffee plantation just mentioned, I observed it sitting on the lower branches of the coffee trees near trenches. In flight its broad wings and short tail are very characteristic, buzzard-like. I never heard any call note, and I have no evidence of its breeding or its whereabouts the rest of the year.

Falco peregrinus anatum.—While camping on one of the lagoons that lie behind the woods bordering the seacoast east of Nieuw Nickerie, I heard on the evening of December 20, 1946, the unmistakable notes of a Duck Hawk and saw the bird alight on a stake in the water. Unfortunately, I missed it in the darkness and the bird disappeared. The next morning, December 21, it was sitting again on one of the stakes. It was collected by my guide and proved to be a male (Collector's no. 108, now in the American Museum of Natural History, New York).

This is the fourth record for Surinam. Voous (1945) reported a specimen from Surinam without date or locality, which he claimed to

be the first record, but he overlooked the note by Thomas E. Penard (1927) who mentioned a specimen collected by August Kappler in Surinam. This latter specimen was sent to the Stuttgart museum. The molting young female taken on April 19, 1922, at Kwatta referred to the race *cassini* by Penard (*loc. cit.*) is, according to Hellmayr (1949), a somewhat aberrant *anatum*. I believe the Duck Hawk is of rather regular occurrence on migration in Surinam, as I also have two sight records. On March 3, 1947, I observed a bird flying low over the Surinam River at Paramaribo, and on March 5, 1947, I had a very fine view of an adult, sitting on one of the stakes put into the water by fishermen in the tributary of the Coppename and Saracca rivers, a place like the lagoons at Nieuw Nickerie, teeming with waterfowl, and for that reason ideal for Duck Hawks.

Columbigallina minuta minuta.—Peters (1937) did not include Dutch Guiana in the range of this little dove, so apparently he had no specimens available from this country. Hellmayr and Conover (1942) included Surinam only on authority of the Penard brothers (1908), but their book covered the avifauna of the three Guianas without making any reference to the different countries. It was not represented in the large collection from Surinam assembled for Thomas E. Penard (Bangs and Penard, 1918); nor was it in the Penard oölogical collection (Hellebrekers, 1942). This bird seems to be of very local distribution in Surinam, as I observed it regularly, and as a rather common breeding bird, only on the grounds of the Agricultural Experiment Station at Paramaribo where I collected nine specimens.

Here I found, on November 3, 1946, two nests with two and one egg. On November 8, 1946, I found a nest with two eggs, and on October 28, 1948, two nests with one and two eggs, respectively. The measurements of four eggs are: 21.1 by 16; 19.9 by 16; 21.2 by 15.9 and 21 by 15.5 mm. Its favorite breeding locality in those years was a neglected field of *Manihot utilitissima* overgrown with weeds. The small nests were built among the bushes about half a meter above the ground.

Bubo virginianus scotinus.—Peters (1940) said of this race, "only known from the type locality in the Orinoco valley of Venezuela." This owl is, however, already long known from British and Dutch Guiana. Chubb (1916) mentioned several localities in British Guiana. For Surinam, it was represented in the collection of birds sent by Kappler (1881) to the Stuttgart museum.

In the neighborhood of the same lagoons near Nieuw Nickerie, as mentioned in the Duck Hawk section, I collected a female on August 4, 1946 (Collector's no. 46, now in the American Museum of Natural

History, New York). In the same locality I observed a specimen on August 17, 1947. It was sitting on the lower branches of a tree and took a threatening attitude, puffing up its feathers and lowering its wings, on our approach; it apparently had young in the neighborhood.

The habitat of this owl consists of large woods of *Avicennia nitida* bordering the seacoast. I received a female, collected in a similar habitat near the coast at Coronie on December 20, 1948. I have the impression that this large owl is rather common all along our coast, as Dr. Geyskes of Paramaribo told me of having observed this species in the same sort of habitat near Matapica Creek in the Commewijne district.

Discosura longicauda.—This easily recognizable hummingbird is listed by Peters (1945) as only from British and French Guiana. On July 28, 1947, I observed a fine specimen, its long racket tail being very striking, sitting in a small tree near Albina on the left bank of the Maroni River.

Xiphorhynchus obsoletus obsoletus.—Listed by Hellmayr (1925) only for French and British Guiana. On September 28 and October 14, 1947, I collected two males of this species at Republiek (some 40 kms. due south of Paramaribo). (Collector's nos. 363 and 406, both specimens now in the American Museum of Natural History at New York).

Cercomacra tyrannina saturator.—Listed by Hellmayr (1924) as from British Guiana only. On January 25, 1948, I collected a male at Republiek, about 40 kilometers south of Paramaribo (Collector's no. 514, now in the American Museum of Natural History, New York).

Tyrannus dominicensis vorax.—Hellmayr (1927) listed this race only for British and French Guiana. In Surinam it is, however, a rather common migrant, my dates ranging from November 10 to March 25. Five specimens collected near Paramaribo and now in the American Museum of Natural History at New York belong according to Zimmer, to the race *vorax*.

Empidonomus varius rufinus.—Listed by Hellmayr (1927) only for French and British Guiana. Zimmer (1937) mentioned a bird of the race *varius* from Paramaribo, Surinam, which he took for a migrant. He further remarked that the species has been recorded as nesting in British Guiana and that it is quite probable that *rufinus* does breed in that country and possibly further to the northwest in Venezuela. In connection with this it is of interest that on December 12, 1948, I collected a female, flushed from its nest, in the savanna at Zanderij. According to Zimmer to whom I sent the bird, it belonged to the race *rufinus* (Collector's no. 700, now in the American Museum of Natural History at New York).

The nest was built at about three meters height in a low tree in the savanna and contained two eggs. Measurements of the eggs were: 25 by 16.7 and 25.6 by 17.5 mm. Weight of one shell was 175 milligrams.

This species occurs regularly in this locality, as I had already collected a male on July 7, 1947, and another male on February 27, 1949.

Tolmomyias flaviventris collingwoodi.—Though Hellmayr (1927) listed this species only for British Guiana, Zimmer (1939) mentioned specimens from Surinam in his review of the genus *Tolmomyias*. This is quite a common bird in the cultivated areas of the coastal region where it is found especially among the shade trees in the coffee plantations. I have several specimens in my collection. On June 15, 1947, I flushed a bird from its nest, hanging at the end of a branch in a bamboo shrub; the nest was empty.

Tyranneutes virescens.—Listed by Hellmayr (1929) as from British Guiana and Northern Brazil only. On November 26, 1947, I collected a female at Republiek (Collector's no. 448, now in the American Museum of Natural History, New York).

Elaenia cristata.—Listed by Hellmayr (1927) only for French and British Guiana. Zimmer (1941), however, mentioned some specimens from Surinam in his review of the genus *Elaenia*. This bird is quite common and one of the most characteristic birds on the wide and open savanna at Zanderij, wherever there is a low vegetation of bushes or single shrubs of the genus *Clusia*. Here I collected several specimens, one of which I sent to the American Museum of Natural History at New York.

On October 25, 1948, I flushed a bird from its nest, built at about one meter height in a shrub of *Clusia*. The nest was of typical *Elaenia* structure, carefully woven of small roots with dry moss, fibers and wool in a fork. The cup was lined with fibers and wool. Measurements of the nest were: height, 65 mm.; width, 65; depth of nest-cup about 25. It contained one fresh egg, which was white with a few small red spots all over its surface. Measurements of the egg were 19.1 by 15.2 mm. In the same locality and in exactly the same situation, I found another nest on April 24, 1949, which contained two fresh eggs. Measurements of the eggs were 19.5 by 14.6 and 19.3 by 15.3 mm. Weight of the fresh eggs was 2.34 and 2.32 grams.

Capsiempis flaveola flaveola.—Listed by Hellmayr (1927) as from French and British Guiana only. On October 27, 1947, I collected a female at Republiek (Collector's no. 419, now in the American Museum of Natural History, New York).

Atticora fasciata.—Listed by Hellmayr (1935) only for French and

British Guiana. This swallow seems, however, to be quite common and of regular occurrence along the forest-fringed rivers in the interior of the country. I regularly observed it when travelling by motor-launch on the upper Nickerie and Wayombo rivers. On all my trips (March 19, August 6, December 22, 1946, and May 9 and August 23, 1947) I watched numbers of them flying low over the water or sitting on dead branches in the river, often in company of *Iridoprocne albi-venter*. Not knowing at that time that it was not yet obtained in this country, I neglected the opportunity to collect specimens.

On April 12 and 13, 1949, I further observed many birds all over the Grankreek to the point where it joins the Maroni River, and on the last named river from Nassau Mountain down to the Hermina Rapids.

Atticora melanoleuca.—Hellmayr (1935) listed this bird only for British Guiana. On April 13, 1949, I observed several individuals on the Maroni River from Nassau Mountain down to the Hermina Rapids. Unhappily, I was not able to collect specimens at that time.

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Paramaribo, Surinam, Dutch Guiana, October 29, 1949.

BY-LAWS AND RULES OF THE AMERICAN ORNITHOLOGISTS' UNION

BY-LAWS

Article I. Of Members

Section 1. The membership of the Union shall consist of the following classes: (1) Fellows, (2) Emeritus Fellows, (3) Honorary Fellows, (4) Corresponding Fellows, (5) Members, (6) Associates, and (7) Patrons.

Section 2. Fellows shall be citizens or residents of the United States, Canada, or Newfoundland. They shall be limited to fifty individuals of not more than sixty-five years of age, and this without prejudice to the number, status, or further election of older Fellows.

Section 3. Emeritus Fellows shall be persons who, by their own desire and by vote of the Council, have been transferred to this class from the Class of Fellows.

Section 4. Honorary Fellows shall be limited to twenty in number. They shall be chosen for their eminence in Ornithology, and may be residents of any country except the United States and Canada.

Section 5. Corresponding Fellows shall be limited to seventy-five in number, and may be residents of any country except the United States and Canada. Not more than four Corresponding Fellows shall be elected at a single Stated Meeting.

Section 6. Members at the time of their election shall be residents or citizens of the United States, Canada, or Newfoundland, and shall be limited to two hundred in number.

Section 7. Associates and Patrons may be residents of any country, and shall not be limited in number.

Article II. Of Officers

Section 1. The Officers of the Union shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and nine Councilors. These officers, together with the Editor, the Ex-Presidents, and designated representatives (one in each case) of affiliated ornithological societies as hereunder defined, shall constitute the Board of Management or Council of the Union, for the transaction of such business as may be assigned to it by the By-Laws or by the Union. Affiliated ornithological societies are hereby defined as all those of Nearctic America which are primarily devoted to scientific Ornithology and include in their

membership one hundred or more individuals who are also Associates, Members, or Fellows of the Union.

Section 2. The President or, in case of his absence or inability to act, one of the Vice-Presidents shall preside at the meetings of the Union and of the Council, and shall appoint all Committees except such as are otherwise provided for.

Section 3. The Secretary shall keep a record of the meetings of the Union and of the Council; shall give at least three weeks' notice to all Fellows, Members, and Associates of the time and place of meetings, shall report to the Council all nominations for membership received by him, and, at least three weeks before each Stated Meeting, shall send to each Fellow a list of the nominees for the classes of Fellows and Members, and to each Member a list of the nominees for the Class of Members, with a statement of the residence of each nominee and the names of the Fellows or Members signing his nomination; shall notify the Fellows of all proposed changes in the By-Laws; shall notify all members-elect of their election, and Committees of their appointment; shall acknowledge all donations to the Union and report the same at the next Stated Meeting; and he shall have charge of the corporate seal of the Union.

Section 4. The Treasurer shall receive all moneys due or payable to the Union and shall pay all accounts against it when the same have been approved by the President. He shall receive officially all moneys given or bequeathed to the Union, and shall transmit all principal to the Trustees. He shall make a report to the Union of all receipts and disbursements at each Stated Meeting.

Section 5. Vacancies occurring in any office may be filled by vote of the Council until the next annual election.

Article III. Of Meetings

Section 1. Stated Meetings of the Union shall be held annually, at such time and place as the Union may determine. The time and the place for any Stated Meeting, appointed by the Union, may be changed by the Council by a two-thirds vote of its members. Special meetings shall be called by the Council as occasion may require, due notice thereof being given by the Secretary.

As occasion demands, the Secretary, at the direction of the President, may submit matters for decision to the Council for vote by mail ballot. All such votes of the Council made by mail ballot shall be placed on the record and submitted for ratification at the next meeting of the Council.

Section 2. In meetings of the Fellows a quorum for the transaction

of business shall consist of ten Fellows; in meetings of the Fellows and Members it shall consist of fifteen Fellows and Members.

Section 3. Five members of the Council shall constitute a quorum for the transaction of business.

Section 4. The scientific meetings of the Union shall be open to the public, unless otherwise ordered by a majority of the Fellows and Members present.

Section 5. Stated Meetings of the Council shall be held immediately preceding each Stated Meeting of the Union and on the day following the election. Special meetings of the Council may be called by the President and Secretary, or by any four members of the Council.

Article IV. Of Elections, Resignations, and Expulsions

Section 1. All elections shall be by ballot. Officers, Fellows, Honorary Fellows, and Members shall be elected individually.

Section 2. All Officers, except members of the Council, shall be elected annually. Members of the Council shall be divided into three classes, three members to serve for one year, three for two years and three for three years, and at subsequent elections members of each class shall be elected for three years as their terms expire, but shall not be eligible to succeed themselves, although they may be reelected at a subsequent meeting. The term of office shall begin at the close of the Stated Meeting at which the Officers are elected, and they shall continue in office until their successors qualify.

Section 3. Elections of Officers are to be held as follows: In each case, nominations shall be made by means of an informal ballot, the result of which shall be announced by the Secretary; after which the first formal ballot shall be taken.

In the ballot for Vice-Presidents, and for members of the Council, each voter may write on one ballot as many names as there are officers to be elected, viz., two on the first ballot for Vice-President, and three on the first ballot for members of the Council; and on each subsequent ballot as many names as there are persons yet to be elected; and those persons who receive the votes of a majority of the Fellows and Members voting shall be declared elected, provided that the number of persons receiving such majority does not exceed the number of persons to be elected, in which case the vacancies shall be filled by the candidates receiving the highest majorities.

If in any case the informal ballot result in giving a majority for any of the candidates, it may be declared formal by a majority vote.

Section 4. Nominations to the classes of Fellows and Members shall be made in writing; each nomination for Fellow or Member shall

be signed by three Fellows or Members; shall state the candidate's name in full, and his residence; and shall be delivered to the Secretary at least three months prior to the Stated Meeting at which the nomination is to be voted on. There shall be a committee of three Fellows, to be appointed by the President for terms at first of one, two, and three years, respectively, and thereafter to rotate in three-year terms, to canvass the field and make nominations to the classes of Fellows, Members, Honorary Fellows, and Corresponding Fellows that will be further acted upon as provided by the By-Laws. Nominations made by this Committee are intended merely to supplement those made by various members of the Union.

Section 5. Elections to the classes of Fellows shall be held in the following manner: The number to be elected shall first be decided by a majority vote of the Fellows present at the Stated Meeting at which the election is to be held, provided that not more than five Fellows shall be elected in any one year.

At each ballot each Fellow present may vote for nominees not exceeding the full number of vacancies to be filled, and the person receiving the highest number of votes shall be declared elected, provided that he receives the votes of at least two-thirds of the Fellows present, and so on until all the vacancies are filled. Any candidate who, in each of five successive ballots, fails to receive the votes of half of the Fellows present shall cease to be a candidate during the remainder of that Stated Meeting.

The election may be suspended at any time by a majority vote of the Fellows present.

During the election a discussion of the merits of nominees will be in order.

Section 6. Elections to the Class of Members shall be held in the following manner: The number to be elected shall first be decided by a majority vote of the Fellows and Members present at the Stated Meeting at which the election is to be held.

At each ballot each Fellow and Member present may vote for nominees not exceeding the full number of vacancies to be filled, and the person receiving the highest number of votes shall be declared elected, provided that he receives the votes of at least two-thirds of the Fellows and Members present, and so on until all the vacancies are filled. Any candidate who, in each of five successive ballots, fails to receive the votes of half the Fellows and Members present, shall cease to be a candidate during the remainder of that Stated Meeting.

The election of Members may be suspended at any time by a majority vote of the Fellows and Members present.

During the election a discussion of the merits of nominees will be in order.

Section 7. The nomination of Honorary Fellows, Corresponding Fellows, and Associates shall be made by the Council to the Union; such members shall be voted on by ballot; and the affirmative votes of three-fourths of the Fellows and Members present shall be necessary to a choice. Honorary and Corresponding Fellows shall be enrolled upon signifying acceptance of membership.

Proposals for the Class of Associates may be made to the Council through the Secretary by any Fellow, Member, or Associate.

Section 8. Fellows only shall be eligible to the offices of President and Vice-President. Members shall share with Fellows the right to vote, to hold the offices of Secretary, Treasurer, and Member of Council, and to take part in the business of the Union, except that Members shall not take part in the election of Fellows, nor in the amendment of By-Laws.

Emeritus, Honorary, and Corresponding Fellows, and Associates may attend meetings, present papers, and take part in the scientific proceedings of the Union.

Section 9. Every Honorary and Corresponding Fellow-elect shall notify the Secretary of his acceptance of membership within one year, and every Fellow-elect, Member-elect, and Associate-elect within six months, from the date of election; in default of which notification, his name shall not be entered on the roll of members.

Section 10. Resignations shall be addressed to the President and acted on by the Council.

Section 11. Any member may be expelled from the Union on satisfactory evidence that said member is an improper person to be connected with the Union, or has made improper use of his membership; such expulsion shall be by a two-thirds vote of the Fellows and Members present at a Stated Meeting, three months' previous notice of such proposed action having been given by the Secretary to each Fellow and Member and to the member accused.

Article V. Of Fees and Assessments

Section 1. The annual dues shall be for Fellows five dollars, for Members four dollars and for Associates three dollars.

No dues shall be required of Emeritus, Honorary, or Corresponding Fellows.

Section 2. The annual assessment for the ensuing year shall fall due on the first day of each Stated Meeting, and shall be in arrears if not paid in ninety days thereafter.

Section 3. No Fellow or Member in arrears for dues, shall be entitled to vote or take part in the business of any meeting.

Section 4. The name of any member one year in arrears for dues shall be removed from the roll of membership unless otherwise ordered by the Council; provided that two notices of indebtedness shall have been given him by the Treasurer, at intervals of three months.

Section 5. Fellows, Members, and Associates, not in arrears for dues, and Emeritus Fellows shall receive the regular serial publication of the Union, entitled 'The Auk,' gratis. All the publications of the Union shall be sent gratis to Honorary Fellows.

Section 6. Life membership, exempting the holder from all further dues or assessments, may be obtained by members of all classes upon a single payment of one hundred dollars or payment of a like sum in four equal annual installments.

Section 7. Any person desirous of furthering the aims of the Union may become a Patron thereof on payment of the sum of one thousand dollars, and his name shall be perpetually inscribed upon the records of the Union.

Any Fellow, Member, or Associate of the Union who becomes a Patron is exempt from annual dues.

Article VI. Of Scientific Communications and Publications

Section 1. The Union may publish, under the direction of the Council, a serial journal of Ornithology, called 'The Auk', and such reports, proceedings, memoirs, and other works on Ornithology as the Council may authorize.

Section 2. Communications on Ornithology may be read at the Stated Meetings of the Union, by any member, or for him by any other member, notice of the same having been previously given to the Secretary.

Section 3. Any member may read a paper for a person who is not a member, and shall not be considered responsible for the facts or opinions expressed by the author, but shall be held responsible for the appropriateness of the paper. Persons who are not members may read papers on invitation of the President, and with the approval of the Committee of Arrangements.

Article VII. Of the Property of the Union

Section 1. A board of three Trustees elected by the Council at each Annual Meeting shall hold all the funded property of the Union in trust with power to sell and to reinvest according to their judgment.

Section 2. No contract shall be binding upon the Union which has not been authorized by the Council. No liability exceeding one thousand dollars, nor total debt exceeding two thousand dollars, shall be incurred by the Council without the formal consent of the Union, as expressed by a majority vote at a Stated Meeting.

Section 3. Bequests and trusts having for their object the advancement of Ornithology may be accepted and administered by the Union. Such devices, bequests, donations, or gifts having for their object the promotion of science or the welfare of the Union, may be accepted by the Council for the Union. Before acceptance of any such trust the Council shall consider the object of the trust and all conditions or specifications attached thereto, and shall make a report of its action to the Union. Unless otherwise provided by the deed of gift, the income of each trust fund shall be applied to the objects of that trust by the action of the Union on the recommendation of a standing committee of that fund.

Article VIII. Of Additions and Amendments to the By-Laws

Notice of proposed additions or amendments to the By-Laws must be in writing, signed by two Fellows, and must be given at a session of the Fellows in a Stated Meeting of the Union. All such propositions shall be referred to the Council, which may amend the propositions and shall report thereon to the Fellows at the same session. Its report shall be considered by the Fellows in committee of the whole for amendment. The proposition, as amended, if adopted in committee of the whole, shall be voted on by the Fellows at the next Stated Meeting, and if it receive two-thirds of the votes cast it shall be declared adopted.

Absent Fellows may send their vote on pending changes in the By-Laws to the Secretary in writing, and such votes shall be counted as if the Fellows were present.

RULES

I. In the absence of the President and Vice-Presidents, a Fellow shall be chosen, or in the absence of the Secretary or Treasurer a Fellow or Member, to perform the duties of the office *pro tempore* by a plurality of *viva voce* votes, upon open nomination.

II. The order of business at Stated Meetings shall be as follows:

First Day's Session

The first session of each Stated Meeting shall be a meeting of the Fellows, for the election of Fellows and the amendment of By-Laws.

The second session of each Stated Meeting shall be the annual business session, for the reception of the reports of the Secretary and Treasurer, the election of officers and members, and action on business reported from the Council, or such other business as may be brought before it, to which session only Fellows and Members shall be admitted. When not otherwise ordered, the annual business session shall be held on the day preceding the first public session.

1. Chair taken by the President, or, in his absence, by one of the Vice-Presidents.
2. Roll-call of Fellows and Members by the Secretary.
3. Reading and approval of the minutes of the previous meeting.
4. Selection of time and place of next Stated Meeting.
5. Report of the Secretary.
6. Report of the Treasurer.
7. Report of the Council, including nominations for membership and other business or recommendations..
8. Election of officers for the ensuing year, preceded by the reading by the Secretary, of the By-Law covering the election of officers.
9. Election of members.
 - a. Honorary Fellows.
 - b. Corresponding Fellows.
 - c. Members.
 - d. Associates.
10. Action on business reported from the Council.
11. Appointment by the President of a committee of three to audit the accounts of the Treasurer.
12. Appointment by the President of a Committee on Resolutions.
13. Reports of Committees.
14. Miscellaneous business.
15. Adjournment.

Second and Third Days' Sessions

1. Chair taken by the President, or, in his absence, by one of the Vice-Presidents.
2. Roll-call of Fellows and Members by the Secretary.
3. Reading and approval of minutes of previous day's session.
4. Report of the Auditing Committee.
5. Report of the Council.
6. Action on business reported from the Council.
7. Reports from Committees.
8. Miscellaneous business.
9. Presentation and discussion of scientific papers, or remarks.
10. Adjournment.

Last Day's Session

1. Chair taken by the President, or, in his absence, by one of the Vice-Presidents.

2. Roll-call of Fellows and Members by the Secretary.

3. Reading and approval of minutes of previous day's session.

4. Appointment by the President of a committee, consisting of three Fellows or Members, to co-operate with the President and Secretary as a Committee of Arrangements for the next Stated Meeting.

5. Report from the Council.

6. Action on business reported from the Council.

7. Reports of Committees.

8. Miscellaneous business.

9. Presentation and discussion of scientific papers, or remarks.

10. Reading and correction of the minutes of the day's session.

11. Adjournment.

III. The business portion of each day's session shall be open to Fellows and Members only.

IV. The Rules of Order of the Union shall be those of the United States Senate, unless suspended by unanimous consent.

V. The order of business at any session of the Union may be varied from the above by a two-thirds vote of the Fellows and Members present.

VI. The claims and qualifications of nominees for membership may be discussed before the Union, but such discussions shall be held as strictly confidential.

VII. There shall be a Committee on Publications, consisting of the President, Secretary, Treasurer, Editor, and Assistant Editor, who shall have charge of the printing of the Union, under the direction of the Council.

VIII. A Committee on Communications consisting of three Fellows or Members shall be appointed by the President each year, which shall receive from the Secretary all papers sent to him, from which said Committee shall select those to be read at the next Stated Meeting.

IX. The publication of the quarterly journal, 'The Auk,' shall be in charge of the Council, which, at each Stated Meeting of the Union, shall appoint the editorial staff for the ensuing year and shall authorize the editorial staff to secure a competent publisher and otherwise provide for the proper publication of the journal.

X. Any of the above Rules may be amended, suspended, or repealed, on the written motion of two Fellows or Members signed by

them and presented at a Stated Meeting of the Union, provided that the same shall be approved by a two-thirds vote of the Fellows and Members present.

CERTIFICATE OF INCORPORATION
OF THE
AMERICAN ORNITHOLOGISTS' UNION

THIS IS TO CERTIFY that we whose names are hereto subscribed, citizens of the United States, and a majority of whom are citizens of the District of Columbia, have associated ourselves together, pursuant to the provisions of Section 545 to 552 inclusive of the Revised Statutes of the United States relative to the District of Columbia, and under an Act to amend the Revised Statutes of the United States, approved April 23, 1884 (23d Statutes at Large, p. 13), as an Association and body corporate, to be known by the corporate name of THE AMERICAN ORNITHOLOGISTS' UNION, for the term of ninety-nine years.

The particular objects and business of this Association are the advancement of its members in Ornithological Science; the publication of a journal of Ornithology and other works relating to that science; the acquisition of a library; and the care and collection of materials relating to the above objects, under the restrictions and regulations established in its By-Laws.

The affairs, funds, and property of the corporation shall be in the general charge of a Board of Management, the number of whose members for the first year shall be twelve, consisting of a President, two Vice-Presidents, a Secretary, a Treasurer, and seven other members, styled Councilors, all of whom shall be chosen by ballot from among the members, at the annual meeting. The duties of these officers, and of other officers and standing committees, and the terms and manner of their election or appointment, shall be provided for in the By-Laws.

WITNESS OUR HANDS AND SEALS, this fourteenth day of November, Eighteen hundred and eighty-eight:

ROBERT RIDGWAY (Seal)

C. HART MERRIAM (Seal)

HENRY W. HENSHAW (Seal)

LEONHARD STEJNEGER (Seal)

ALBERT K. FISHER (Seal)

Witness to all signatures

JNO. D. MCCHESENEY

DISTRICT OF COLUMBIA, ss:

I, John D. McChesney, a Notary Public in and for the District aforesaid, DO HEREBY CERTIFY That Robert Ridgway, Henry W. Henshaw, C. Hart Merriam, Leonhard Stejneger, and Albert K. Fisher, parties to a certain Certificate of Incorporation bearing date on the fourteenth day of November, A. D. 1888, and hereunto annexed, personally appeared before me, in the District aforesaid, the said Robert Ridgway, Henry W. Henshaw, C. Hart Merriam, Leonhard Stejneger, and Albert K. Fisher being personally well known to me to be the persons who executed the said Certificate, and acknowledged the same to be their act and deed.

Given under my hand and
notarial seal, this 14th day of
November, A. D. 1888.

(Seal)

JNO. D. MCCHESENEY,
Notary Public.

OFFICE OF THE RECORDER OF DEEDS,
DISTRICT OF COLUMBIA.

Received for Record Nov. 15, 1888, at 10.41 A. M.

Recorded in Liber No. 4, folio 382, Act of Incorporation Dist. of Col.

Examined by

JAS. M. TROTTER,
Recorder.

GENERAL NOTES

Three Brown Pelicans in Illinois.—On Saturday, April 24, 1948, three "great birds" flew over the city of St. Louis, resulting in news stories in two St. Louis newspapers. The following day, James Nielson, Wallace Elmsley, and the writer were doing field work 30 miles south of Quincy, when three Brown Pelicans, *Pelecanus occidentalis*, flew not 50 feet above our heads. I studied them carefully with eight-power binoculars; there was no question of their identity. They were probably the same three birds that were seen over St. Louis the previous day.

In so far as I can discover, there are but four previous records of the Brown Pelican in Illinois. In the Steinheuer collection is a skin of a bird killed on a lake south of Vandalia. Benjamin Gault (Check-List of the Birds of Illinois, 1922: 35) says, "Rare straggler from the gulf coast. But one positive record, viz;—Lacon, Marshall County (Gault) on authority of Judge Barnes." Robert Ridgway (The Ornithology of Illinois, 2: 200, 1913) says, "The brown pelican is barely entitled to a place in the list of Illinois birds, on account of a single specimen having been seen (not taken) by Mr. C. K. Worthen, near Warsaw (see Bull. Nutt. Orn. Club V 1880, page 31)." In 1913, the writer saw one over the Mississippi at Quincy.—T. E. MUSSELMAN, Quincy, Illinois.

American Egrets near Quebec City, Quebec.—A flight of American Egrets, *Casmerodius a. egretta*, is known to have occurred in the summer of 1948 in north-eastern United States. Some at least reached the Province of Quebec, their first occurrence in the vicinity of Quebec City, as far as is known. On August 1, 1948, Mr. Francois Hamel saw, with binoculars at about 300 feet, two egrets at St. Francois on the Island of Orleans, Quebec. He clearly noted the yellow bill of the American Egret. On the following August 13, a call to the Quebec Zoological Garden from Everell, a few miles northeast of Quebec City, brought Dr. J. A. Brassard, director of the Zoo, and myself to that place where a man had seen a flock of "white cranes" on the shore. There were, in fact, nearly a dozen white birds standing on the shore about half a mile away. With binoculars, they looked very much like egrets, and a closer approach to one of these birds clearly showed that it was an American egret. The distance and bad lighting, it was 8 p. m., did not permit a clear view of its yellow bill, but similarity in size with a Great Blue Heron, standing a few feet from the egret, helped in identification. A few minutes later the bird took flight toward the Island of Orleans. We were told by our host that the flock of "white cranes" had come to that shore at Everell every day in the morning and in late afternoon for nearly two weeks. They were very shy and hard to approach. Later, Mr. Louis A. Lord, taxidermist at the Quebec Provincial Museum, was told by a hunter that "white cranes, never seen before" were still to be found near St. Peter, Island of Orleans, in mid-September.—RAYMOND CAYOUE, Quebec Zoological Society, Charlesbourg, Quebec.

Lesser Snow Goose and Blue Goose at Lexington, Virginia.—On November 18, 1948, at a small fish pond on the farm of Joshua Womeldorf near Lexington, I collected an immature male (?) Lesser Snow Goose, *Chen h. hyperborea*, and an immature female (?) Blue Goose, *Chen caerulescens*. Drs. A. Wetmore and H. Friedmann kindly examined the skins and confirmed the identifications. The birds were in poor flesh, the Snow Goose weighing four pounds, three ounces, and the Blue Goose, three pounds, 14 ounces. The Snow Goose was heavily infested with ectoparasites, identified by Robert T. Mitchell as *Trinoton querquedulae* (L.). The Lesser Snow Goose is

rare in Virginia, even on the coast. The only other records for these species in the mid-Appalachian region are those listed by Maurice Brooks for West Virginia (A Check-List of West Virginia Birds, 1944: 14): two Lesser Snow Geese and a Blue Goose seen near Bluefield in 1942, and a Blue Goose taken near Morgantown, November 21, 1914.—J. J. MURRAY, *Lexington, Virginia*.

Ducks Continue to Nest after Brush Fire at Castalia, Ohio.—On April 17, 1948, a part of the Resthaven Wildlife Sanctuary at Castalia, Ohio, was accidentally burned. The burn covered approximately 100 acres of land strip-mined for marl many years ago and now supporting a mixed growth of herbaceous and woody plants. The area was visited April 24 to confirm reports of mortality of rabbits and damage to pheasant and duck nests caused by the fire. The fire had been hot enough to burn all of the dead herbaceous cover and, a week later, no green sprouts had appeared through the ashes and charred remains of plant stems.

Intensive searching in a two-acre section of the burned area revealed the blackened fragments of several pheasant and duck eggs. In addition, a Mallard, *Anas p. platyrhynchos*, and a Black Duck, *Anas rubripes*, were flushed from nests which had been completely burned over and had no cover remaining around them. The mallard nest contained five scorched and four unscorched eggs, the latter apparently having been laid after the fire. The black duck nest contained 12 eggs, all blackened on one side by the fire. The nest had been relined with down and the female had evidently been incubating the eggs for a week following the fire.

In an attempt to obtain photographs of the incubating hens, April 26, both hens were again flushed from their nests. A final visit, May 14, showed that both nests had been disrupted and the eggs destroyed. Messrs. F. B. Chapman, Roy Hooker, Burt Karbler, E. D. Martin and Clifford Morrow of the Ohio Division of Conservation assisted the writer in his observations.—DANIEL L. LEEDY, *Ohio Cooperative Wildlife Research Unit, Ohio State University, Columbus 10, Ohio*.

Gadwall Nesting in Maryland.—The recorded nesting of the Gadwall, *Anas strepera*, by Griffith (Auk, 63: 436-438, 1946) in salt marshes on Bombay Hook Refuge in Delaware and Pea Island Refuge in North Carolina since 1939 suggested the possibility of the species breeding in suitable coastal marshes between these two points.

On May 18, 1948, while engaged in studies of salt marshes on the eastern shore of Maryland, the writers noticed several pairs of Gadwalls frequenting the tidal ponds and guts one to two miles southeast of Dames Quarter in Somerset County. The males of each pair exhibited definite signs of defense behavior, vigorously chasing the females of other pairs flying in the near vicinity. Because of the late date and the fact that the species was not known to breed in Maryland, it was decided to watch them more closely.

Egg shells of Gadwalls, probably broken by a raccoon, were discovered on May 19; on the following day one female was flushed from her nest containing eight eggs. This nest was built in a clump of switchgrass, *Panicum virgatum*, under a high tide bush, *Iva frutescens*, and was located on the side of a road bank adjoining a salt-meadow cordgrass, *Spartina patens*, marsh. The nearest water was in a ditch on the other side of the road, a distance of 15 feet. This is in agreement with other records on the east coast where the species has been found nesting in similar salt marshes not far from water.

Lack of time prevented us from searching for other nests, but at least seven pairs were seen in an area approximately 1.5 miles long by .75 miles wide. Several of

these birds were seen again on June 17 and July 3. Mr. Francis M. Uhler, of the Patuxent Refuge, visited the same area on the latter date and observed one brood of ten young about four or five days old.

Gadwalls have also been reported nesting at Jones Beach on Long Island, New York, for the past two years (Auk, 65: 610-612, 1948; and Aud. Field Notes, 2: 199, 1948), and in New Jersey since 1946 (L. G. MacNamara *in litt.*). Thus there are recent records for all of the seaboard states from New York south to North Carolina with the exception of Virginia. The caretaker of the Maryland marsh in which the Gadwalls were nesting stated that he had not observed them during previous years. This, along with the fact that the other coastal breeding stations have been recorded only recently, suggests that these are newly established colonies.—PAUL F. SPRINGER and ROBERT E. STEWART, *U. S. Fish and Wildlife Service, Patuxent Research Refuge, Laurel, Maryland*.

European Teal Again in Coastal South Carolina.—On November 28, 1947, on Bull's Island, S. C., the writer with a group of eight observers, saw a well plumaged male *Anas crecca* in House Pond. The bird was about 50 yards distant, in excellent light, and in company with four or five drakes of *Anas carolinense*. Even the observers unfamiliar with ducks could readily see the differences between this bird and the accompanying teal. The lack of the white bar in front of the wings and the presence of the horizontal white stripe on the scapulars were perfectly apparent and commented on by all of them.

The occurrence of *A. crecca* in South Carolina is purely accidental. One specimen was taken on February 13, 1930, at the Santee Gun Club, Charleston County, by Richard Bishop (Stone, Auk, 51: 227, 1934), and constituted the first record for this region. In December, 1946, the writer saw one of these teals on Bull's Island, practically in the same place as recorded above. There are then three records for this accidental wanderer in South Carolina, two of them sight records by this writer.—ALEXANDER SPRUNT, JR., *The Crescent, Charleston 50, South Carolina*.

A Correction in the Generic Name for *Eocathartes grillator*.—In proposing the genus *Eocathartes* for a fossil species of American vulture (Family *Cathartidae*) (Ann. Carnegie Mus., 30: 58, 1944) I was not aware of the earlier use of this name for the Old World fossil *Eocathartes robustus* by Lambrecht (Nova Acta Leopoldina, Bd. 3 (14): 362, 1935). For the preoccupied *Eocathartes* Wetmore 1944, I propose the name *Neocathartes*, with *Eocathartes grillator* Wetmore as type. This will be placed in the Family *Neocathartidae* of the superfamily *Neocathartoidea* as *Neocathartes grillator* (Wetmore).—ALEXANDER WETMORE, *Smithsonian Institution, Washington, D. C.*

White-tailed Kite on the Kissimmee Prairie.—The White-tailed Kite, *Elanus leucurus majusculus*, is now so rare in Florida that any occurrence is worthy of report. On January 1, 1949, my wife and I and Mr. and Mrs. Glenn Chandler saw one on the Kissimmee Prairie between Lake Istokpoga and Fort Bassenger. The bird rose from a ditchbank near us and flew in open view for 200 yards, showing clearly the black area on the forepart of the wings and beneath the black patch at the end of the wings. It was not fully mature, as the tail was pearly rather than white in color.—J. J. MURRAY, 6 White Street, Lexington, Virginia.

What is *Spizaetus devillei* Dubois?—In 1874, Dubois (Bull. Acad. Roy. Belgique, 38: 129) described and figured in color two eagles from Ecuador, giving them the new name, *Spizaetus devillei*. Chapman in his volume on the birds of Ecuador

(Bull. Amer. Mus. Nat. Hist., 55: 236, 1926) listed the name but merely said, "We have no specimens." Peters (Check-List Birds of the World, 1: 248, 1931) stated that this name was probably based on examples of *Spizaetus ornatus*.

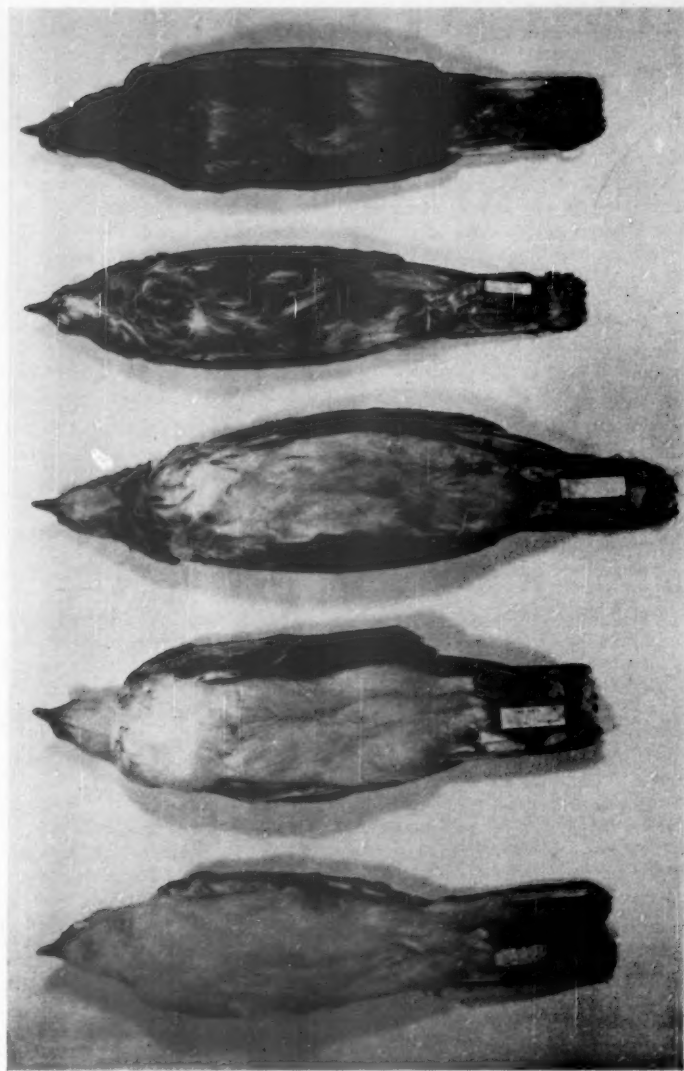
In 1946, Conover (Fieldiana-Zoology, 31: 44-45) described an eagle in the Chicago Museum of Natural History that he believed to be the third known specimen of *devillei*. Three years later in the 'Catalogue of Birds of the Americas' (pt. 1, no. 4: 213-214) Hellmayr and Conover again referred to this specimen when listing *devillei* as a good species. In a footnote, Hellmayr suggested that the white-breasted plumage found in the Chicago specimen and in one of Dubois' birds represents the immature stage and that Dubois' other specimen, which is streaked with chestnut and blotched with black above, is the adult, this being the reverse of what Dubois had thought.

These recent references recalled to mind a pencilled note in the handwriting of the late Ernst Hartert, which I came across some years ago among the eagles in the Rothschild Collection. It reads, "*Spizaetus devillei* Dubois, Ecuador = *isidori* juv." Further investigation leaves no doubt in my mind that Hartert (who may have seen the types of *devillei*) was perfectly correct in stating that *devillei* is a synonym of *Oroaetus isidori* (Des Murs, 1845). Mr. Conover's generosity in lending the Chicago specimen was of great help in reaching this conclusion. The plumage changes of Isidor's Crested Eagle are approximately as follows (Pl. 7):

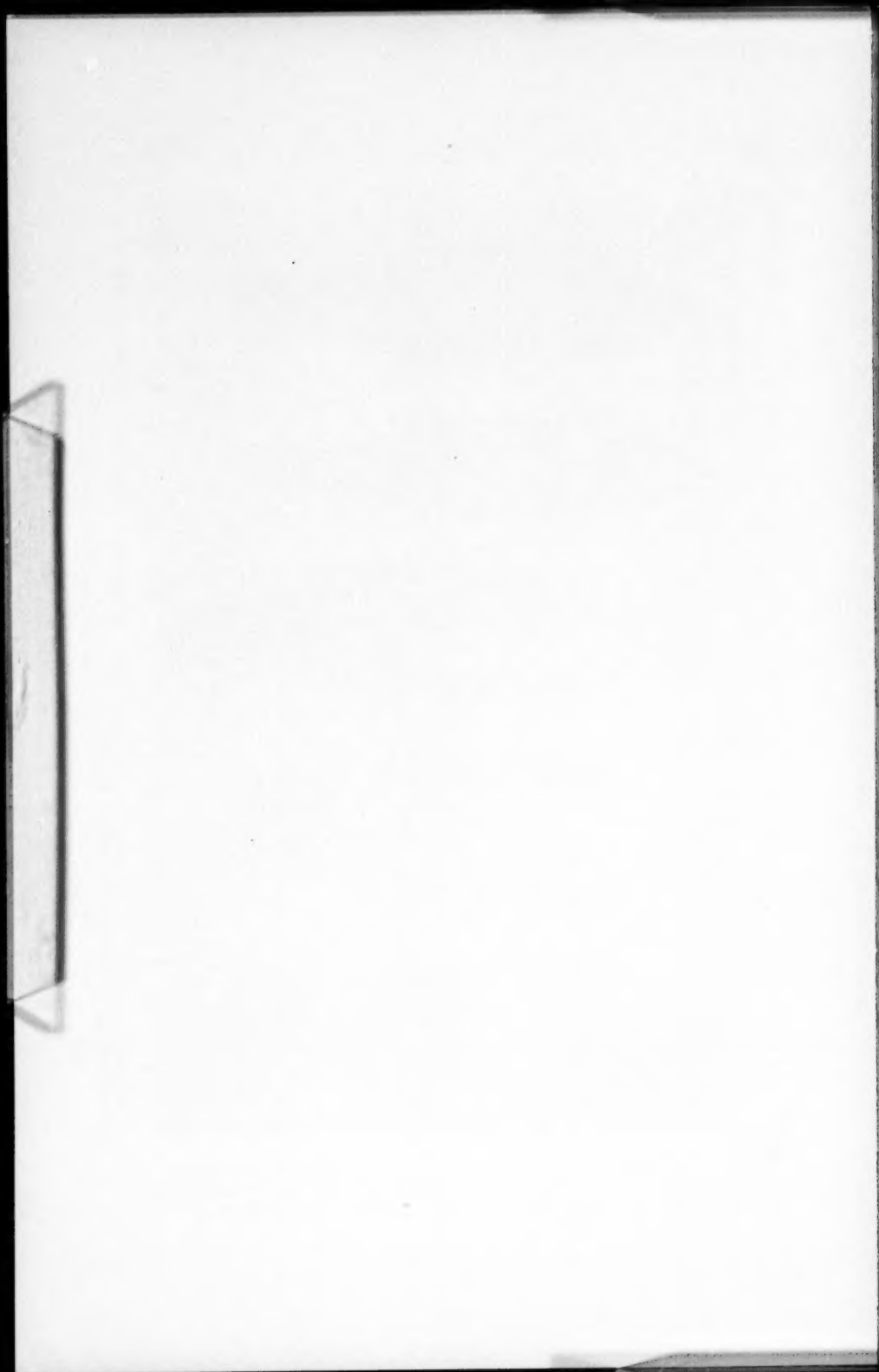
Immatures are whitish below and on the head, with brownish shaft streaks on the flanks and throat. The crest feathers are black-tipped; the back feathers grayish brown with whitish margins; the rectrices marbled grayish with three black bars. Adults are deep brownish black above and chestnut with black shaft streaks below; the tail bars are much broader than in the immatures. The first adult feathers to appear are scattered over the back. A little later the chestnut adult feathers appear here and there on the underparts (Plate 7, center). In one bird with the molt into adult plumage about three-fourths completed, the first adult tail feather with broad black terminal band was just coming in, as pointed out to me by Dr. J. T. Zimmer. The Chicago Museum specimen, at left in the plate, is in almost complete immature plumage, but has the first one or two black adult feathers on the back.

There are several reasons for the long uncertainty as to the correct allocation of *Spizaetus devillei*. Hartert apparently never published his information, and specimens of *isidori* are rare enough in collections to cause confusion in associating immatures and adults. Kirke Swann, however, correctly described the immature plumage but did not mention the name *devillei* (Monog. Birds Prey, 2: 90, 1932-1945). Ridgway (Smith. Misc. Colls., 72 (4): 1, 1920) placed *isidori* in the monotypic genus *Oroaetus*, and in most lists still another genus, *Spizastur*, is placed between it and *Spizaetus*. Actually *isidori*, though a heavier footed, more powerful bird, is rather closely related to *Spizaetus ornatus*, the type of the genus, as shown by the similarity in their immature plumages and by the striking difference between immatures and adults of both forms. The generic relationship of the numerous New and Old World eagles related to *Spizaetus* is, however, a problem that should not be tackled piecemeal. For the time being it is sufficient to point out that *devillei* is a synonym of *isidori*.—D. AMADON, American Museum of Natural History, New York.

Ring-billed Gulls Feeding on Fruit of Cabbage Palmetto.—In 'The Auk' (58: 579, 1941) is a note by Mr. Maurice Broun about Ring-billed and Herring Gulls feeding upon the fruit of the cabbage palmetto. I would like to add my corroboration to this report. I have observed this feeding habit in the Ring-billed Gulls, *Larus delawarensis*, not infrequently along the Indian River, and on Merritt



PLUMAGE SEQUENCES IN *Oroaethus isidori*. VENTRAL VIEW. IMMATURE AT LEFT, ADULT AT RIGHT, TRANSITIONAL STAGES BETWEEN. THE SIZE VARIATION IS SEXUAL.



Island where I live. I have not only seen these gulls flutter about the pendant fruit stalks of the cabbage palmetto, snatching the berries and flying away, but I have seen large numbers of the drupes on small docks along the river front where resting gulls gather in numbers. On one occasion I saw a Ring-billed Gull discharge one of these drupes, with a dark, watery excrement. Others have reported this practice of these gulls; it is not an uncommon habit in this area at least.—SAMUEL A. HARPER, *Two Rivers Grove, Cocoa, Florida*.

Ring-billed Gulls and Cabbage Palmettos.—During various trips to Florida I have observed Mockingbirds, *Mimus polyglottos*, Boat-tailed Grackles, *Cassidix mexicanus*, Florida Jays, *Aphelocoma coerulescens*, Blue Jays, *Cyanocitta cristata*, and Red-wings, *Agelaius phoeniceus*, eating the berries of the cabbage palmetto. On several occasions I had suspected the Ring-billed Gulls, *Larus delawarensis*, of eating these berries, but I could never be positive. In January, 1943, I had excellent opportunities to watch several flocks of Ring-billed Gulls gathering this fruit. The birds were gracefully gliding under the heads of the cabbage palms and snatching berries on the wing. I saw this spectacular performance on several occasions at three different localities; the cabbage palms apparently are a regular source of food supply for the Ring-billed Gulls.—ALLAN D. CRICKSHANK, *Rye, New York*.

Record of Zenaida Dove on Florida Mainland.—On November 13, 1948, with Charles M. Brookfield and John O'Reilly, I observed a Zenaida Dove, *Zenaida aurita zenaida*, in a dense hammock between Coot Bay and Flamingo on the mainland of South Florida. We were first attracted by the rather long white stripe in the wings. The bird settled on the lower limb of a gumbo limbo tree and was studied from a distance of 15 to 20 feet, exhibiting the tameness attributed to the species by Audubon (Orn. Biog., 2: 354-359, 1834). The various identifying characters were readily noted: the shortish, almost square-tipped tail with its terminal band of pearl gray; the white stripe along the hind edge of the wings; the diagonal black mark or stripe on the side of the neck. The legs and feet appeared heavier than in other species of pigeons. We watched the bird for fully ten minutes. No certain occurrence in Florida has been recorded since 1832, and there is no previous report from the Florida mainland, Pangburn's record (1918) having been withdrawn.

In 1824, Titian R. Peale visited Florida and collected the Zenaida Dove, presumably from the Keys although his itinerary is not known. This constituted the first report of the species for this country (Howell, *Florida Bird Life*, 1932: 9). In the spring of 1832, Audubon found the Zenaida Dove nesting near Indian Key and also noted it on a small key between the Tortugas and Key West. He wrote that it arrived in the Keys about April 15, the male birds first and the females a week later. Eggs were laid about May 1 and both sexes, with their young of the year, returned to the West Indies by October. It is possible that the individual observed by our party in mid-November was a straggler brought in by one of the hurricanes of the previous September and October, which swept through the region where this bird was seen. However, it should be noted that another West Indian species, the White-crowned Pigeon, *Columba leucocephala*, which still nests in the Keys, usually has migrated towards Cuba and the West Indies by September or early October, but a small group winters on the mainland near Cape Sable, as mentioned by Howell. I have observed them there a number of times in the months of January and February.—ROBERT P. ALLEN, *Tavernier, Florida*.

Groove-billed Ani in Florida.—On December 19, 1948, a Groove-billed Ani, *Crotophaga sulcirostris*, was seen at Cedar Key, Levy County, Florida, by the writer

as he was riding in an automobile with B. W. Cooper and J. D. Kilby. Identification was possible because of the slow speed of the car and because the bird was only about three or four yards from the road in a small oak tree. By the time the car stopped, the bird had disappeared into a thicket. The weather was cold and cloudy with strong winds from the northwest.

On December 22, 1948, Pierce Brodtkorb returned to Cedar Key with Cooper and S. K. Eshleman III and discovered the bird in exactly the same tree. It flew across the road into a nearby clump of bushes and was shot by Cooper.

The specimen was a female; it weighed 71.9 grams and was fat. The ovary measured five by 11 mm. The stomach contained two Orthoptera (*Macneillia obscura* and *Belocephalus davisi*, determined by I. J. Cantrall), an immature spider (Family Argiopeidae, determined by H. K. Wallace), an ant (*Pheidole* sp., *flavens* group, determined by A. Van Pelt), the leg of a beetle, and fragments of miscellaneous Hemiptera. The skin is now in the collection of Pierce Brodtkorb.

Howell (Florida Bird Life, 1932: 290) gives only two records of this species in Florida.—THOMAS W. HICKS, *Department of Biology, University of Florida, Gainesville, Florida.*

Rehabilitation in the Wild.—That nature's progeny are often highly adaptable was demonstrated by an adult Screech Owl, *Otus asio naevius*, that had lived for some time with but one leg.

A Screech Owl struck on the head by motor traffic near McConnellsburg, Pennsylvania, on October 9, 1948, was in surprisingly good condition for the possessor of but a single leg. A careful inspection of the carcass revealed no vestige of a left leg. The socket (*acetabulum*) for the head of the thigh bone was normal on each side. The left leg had apparently been pulled from its socket a considerable time before, as the skin over a very small hole—about the diameter of a man's smallest finger—was wrinkled and completely healed.

Despite its obvious handicap, this Screech Owl had evidently managed to make a satisfactory living. The bird was in good flesh, and its stomach and gullet were well filled with a variety of foods. Examination showed that this crippled bird had recently fed upon the following items (listed in approximate volumetric percentages):

One white-footed mouse (<i>Peromyscus</i>).....	70 per cent
Four large grasshoppers (<i>Melanoplus differentialis</i>) and fragments of four others (probably of same species).....	12 per cent
Fragments of 16 camel-cricket (<i>Ceuthophilus</i> sp.).....	5 per cent
Two small grasshoppers (<i>Melanoplus femurrubrum</i>).....	4 per cent
Fragments of 12 grasshoppers (<i>Acrididae</i>).....	4 per cent
Fragments of three field crickets (<i>Gryllus assimilis</i>).....	4 per cent
Fragments of four large spiders (<i>Lycosidae</i>).....	1 per cent
Fragments of one walking-stick (<i>Phasmidae</i>).....	trace
Fragments of one wasp (<i>Hymenoptera</i>).....	trace
Fragments of one ground beetle (<i>Carabidae</i>).....	trace
Fragments of one large seed, undetermined.....	trace

—CLARENCE COTTAM, *Fish and Wildlife Service, Washington, D. C.*

Two Calamities to Roosting Chimney Swifts, *Chaetura pelagica*.—Early in December, 1945, an explosion in the heating system of a Quincy, Illinois, store was caused by dead Chimney Swifts which prevented the normal draft. A heaping bushel basket of dead birds was removed from the flue. The following year a disagreeable odor in the Methodist church revealed a similar but greater tragedy. Nearly two baskets of dead birds were found in the base of the great chimney of that institution.

The answers to inquiries made to several combustion engineers and to bio-chemistry professors in several universities were in accord, that death to the swifts was most probably caused by carbon monoxide gas which is more likely to be formed as a component of flue gases when the heating plant is cold. Gas, coal, or oil burning against cold surfaces may be incompletely oxidized, with the production of considerable quantities of carbon monoxide.

Local bird enthusiasts hope to cover such chimneys with galvanized chicken wire to prevent further destruction of swifts.—T. E. MUSSELMAN, Quincy, Illinois.

Breeding Record of Red-headed Woodpecker in Southern Quebec.—Mr. E. M. Putnam of Hudson Heights, Province of Quebec, on the southerly shore of the Lac des Deux Montagnes, informed me that, when passing through Belle Plage on July 10, 1948, he had seen from his car a Red-headed Woodpecker, *Melanerpes erythrocephalus* (Linnaeus). Belle Plage is some six miles east of Hudson Heights along the lake-shore road to Dorian-Vaudreuil.

On July 14, I visited Belle Plage with Mr. Putnam. On arrival at the property of Mr. Eugene Vinet at the junction of the above lake-shore road and the road from Isle Cadieux to the Canadian Pacific Railway station of that name, we immediately located the bird in a maple tree on Mr. Vinet's lawn, from which it flew into a tall ash tree. We then saw the same individual, or its mate, on a small elm tree across the main road, sitting on a stub branch some 40 feet above the ground. It was clear that this branch had broken at the place where woodpeckers had made a nest-hole.

Mr. and Mrs. Vinet informed us that they had watched with interest a pair of these birds for some weeks, that they had observed them at the nest-hole and, shortly before the branch was broken off in a violent storm that occurred on July 11, they had seen the adult bird (or birds) feeding fledglings on the tree outside the nest-hole. They could not give the exact number of fledglings seen, but said there were three or four. Later on the same day, Mr. Putnam and I had further excellent views of the adult male on some willow trees.

On July 18, with Mr. C. H. Sullivan, I again visited Mr. Vinet's property when he told us he had seen both adults together that morning. On this occasion we had excellent views of the adult female, watching her during a severe thunder-storm with heavy rain, going up the trunk of a maple tree and flying down from its branches to the lawn below several times, apparently to capture insects of some kind. We saw nothing of the fledglings.

Ernest D. Wintle in 'The Birds of Montreal' (1890) refers to *Melanerpes erythrocephalus* as a "scarce summer resident" and to two observations of individuals of the species on the island of Montreal on May 24, 1882, and June 24, 1883. He also refers to a nest with eggs found by G. A. Dunlop at Lachine.

C. E. Dionne in 'Les Oiseaux du Canada' (1883) merely states, "should be met in our woods." In 'Les Oiseaux de la Province de Quebec' (1906), he terms the species "accidental" in Quebec and states that he has only seen two specimens, one killed near Quebec City and another at St. Augustin, Portneuf.

In 'Catalogue of Canadian Birds,' Part II, by John Macoun, the species is referred to as "a rather rare resident at Ottawa." E. D. Wintle is reported to have found it breeding in a hole in a dead tree along a fence between two woods at Longue Pointe on May 24, 1889.

Bent, 'Life Histories of North American Woodpeckers' (1939), includes southern Quebec in the distribution of this species (Three Rivers, Hatley and Quebec City). He gives, "spring migration date Montreal May 7"; fall migration is not mentioned.

Mr. L. M. Terrill of Montreal states (*in litt.*) "it is undoubtedly a rather scarce bird in the district. When a boy I first saw this woodpecker in a clump of trees near Dominion station (Lachine District) and found its nest there."

In 1907 and 1909, Terrill saw it between Iroquois and Morrisburg, "where it appeared to be fairly well distributed." At different times he has seen it at St. Andrews East, St. Rose, Nomingue (his most northerly record), Longueuil, Dorval Island, Ste. Anne de Bellevue, Senneville and Chambly Canton.

Terrill states the Bird Society has records of the nesting of this species in 1936 and 1937, for Mount Royal, on Outremont Mountain in 1942, and for a pair for several years on Dorval Island.

Mr. Hoyes Lloyd published (*Can. Field-Nat.*, 58 (5), 1944) a record for the species in the Ottawa district, saying, "During the summer of 1922 . . . while others were seen by me at Rivermead, five miles west of Hull (Quebec)." He gives me the following dates for occurrence in the Quebec portion of the Ottawa district—Rivermead Golf Club: July 16, 1922, one; August 5, 1922, one or two; August 26, 1922, two.

I am indebted to Mr. Hoyes Lloyd, Mr. L. McI. Terrill, and the Librarian, Redpath Library, McGill University, for assistance in compiling this information.—GEOFFREY G. OMMANNEY, P. O. Box 14, Hudson Heights, Province of Quebec, Canada.

A New Woodhewer, *Xiphocolaptes*, from Peru.—A critical study of the Peruvian forms of the family Dendrocolaptidae represented in the collections of the Academy of Natural Sciences of Philadelphia has resulted in the detection of a new race of the widespread species *Xiphocolaptes promeropirhynchus*, for which I propose the name:

***Xiphocolaptes promeropirhynchus solivagus*, new subspecies**

TYPE: Adult male, A. N. S. P. no. 92,543, collected March 16, 1930, at Eneñas, Pichis Trail, Department of Junín, Perú, by M. A. Carriker, Jr.

SUBSPECIFIC CHARACTERS: Nearest to *X. p. obsoletus* Todd, but smaller; under parts paler, more grayish brown (about as in *sanciae-mariae* Hellmayr), with but a slight rufescent tinge, chiefly on the abdomen; upper parts less rufous, the mantle inclining to olive-brown; streaks on pileum paler, whitish rather than buffy. In comparison with *berlepschi* Snethlage and *orenocensis* Berlepsch and Hartert, *solivagus* is much less rufous both above and below, and the bill is much smaller (slenderer) and is darker (in life "dusky horn, paler below").

MEASUREMENTS OF TYPE: Wing (maximum) 133.5 mm.; tail, 108; bill (exposed culmen) 46.5; and tarsus, 34.5 mm. A female measures: wing, 130.5 mm.; tail, 100; bill (exposed culmen) 44.5; and tarsus, 33 mm.

RANGE: Eastern slope of the Eastern Cordillera in the Department of Junín, Perú (Chanchamayo region), probably ranging north to the Department of Huánuco (Pozuzo).

COMPARATIVE MATERIAL EXAMINED: *X. p. obsoletus*.—BOLIVIA: Río Japacani, 1 male,* 1 female* (type); Cerro Hosáne, 1 male,* 1 female* (Dept. Santa Cruz); Palmar, 1 male (Dept. Cochabamba); Teoponte (Río Kaka), 1 male; Santa Ana (Río Coroico), 3 females, 1 (sex ?) (Dept. La Paz). PERU: Río Tavara, 1 male** (Dept. Puno).

X. p. solivagus.—PERU: Eneñas, 1 male (type); San Juan, 1 female (Dept. Junín).

X. p. orenocensis.—VENEZUELA: El Meré (left bank of Río Cassiquiare), 1 male,** Munduapo (Río Orinoco), 1 female,** 1 (sex ?). ECUADOR: Below San José de Sumarco, 1 male.** PERU: Sarayacu (lower Río Ucayali), 1 male.**

X. p. berlepschi.—BRAZIL: Rosarinho (Río Madeira), 4 males.**

X. p. lineatocephalus.—BOLIVIA: Samaipata, 2 males (Dept. Santa Cruz); San Cristobal, 1 female, 1 (sex ?); Incachaca, 2 males, 1 (sex ?) (Dept. Cochabamba); "Yungas de La Paz," 1 (sex ?); Sandillani, 2 males, 1 female (Dept. La Paz).

X. p. phaeopygus.—PERU: Huacapistana, 1 male, 1 female (Dept. Junín).

X. p. compressirostris.—PERU: Leimebamba, 1 male, 3 females; Llui, 1 male, 1 female (Dept. Amazonas).

X. p. ignotus.—ECUADOR: Misagualli (Oriente), 1 male.

X. p. promeropirhynchus, *X. p. virgatus*, *X. p. sanctae-mariae*.—COLOMBIA (series).

* Specimens in Carnegie Museum, Pittsburgh.

** Specimens in American Museum of Natural History, New York.

REMARKS: This race is known from a male from Eneñas (4000 ft.) and a female from San Juan de Perené (4000 ft.), both specimens in the collection of this Academy. In addition, a female from La Gloria, also in the Chanchamayo region, is presumably referable to *solivagus*, as is a male from Pozuzo (Dept. Huánuco). The latter skins were examined and identified as *berlepschi* by Hellmayr who stated, however, that they "have shorter bills and much less rusty suffusion beneath" than those from Brazil (Cat. Birds Amer., 4: 285, footnote b, 1925).

A male from Sarayacu, lower Ucayali, Perú, in the collection of the American Museum of Natural History is obviously referable to *orenocensis*. A male (wing, 142.5 mm.) from the Río Távara, southeastern Perú (Amer. Mus. no. 147,727) is clearly intermediate between *solivagus* and *obsoletus*, but is better assigned to the latter subspecies. It is more rufescent both above and below than *solivagus*, has a pale upper mandible, and differs from any specimen of *obsoletus* now before me in having the mantle slightly less rufous (more olivaceous), and the lower throat and fore-neck grayer.

X. p. solivagus belongs to the *orenocensis* complex and does not require comparison with the very distinct *phaeopygus* Berlepsch and Stolzmann, of which the Academy has two specimens from Huacapistana (6000 ft.), a locality also in the Chanchamayo region of the Department of Junín. The latter form is confined to higher elevations.

I take this opportunity to express my thanks to Dr. John T. Zimmer of the American Museum of Natural History for his courtesy in allowing me to examine material in the collections of that institution, and to Mr. W. E. Clyde Todd, who loaned me his specimens of *X. p. obsoletus*, including the type of this Bolivian form.—JAMES BOND, *Academy of Natural Sciences, Philadelphia, Pennsylvania*.

Sousa's Shrike in Tanganyika Territory.—It is only within the past two years⁸ that R. E. Moreau (Ibis, 1947: 222) has announced the finding of this bird at Mpanda and Busondo, 30 miles south of the Central Railway in western Tanganyika Territory. However, this may possibly have been the shrike which Richard Böhm recorded from Gonda (or Ugunda) in the same region under the name *Corvinella* in the *Journal für Ornithologie*, 1885: 58.

That the actual range of the species extends some 220 miles farther north in Tanganyika Territory is shown by two specimens in the Rothschild Collection. These were collected by Rudolf Grauer in 1907, but were mistakenly labeled at Tring as *Lanius mackinnoni* and thus long escaped notice. The reason for the error is plain; these two specimens have very little rufous on back or wings. But, the wings and tail are not black as in *mackinnoni*. The two birds clearly represent an undescribed northeastern race of *L. souzae*, which I propose to name:

Lanius souzae burigi new subspecies

TYPE: Adult male, Amer. Mus. Nat. Hist. No. 660750, collected between Usuvi,

northwest Tanganyika Territory, and the Kisaka district of eastern Ruanda; June 30, 1907; Rudolf Grauer collector.

DIAGNOSIS: Like *L. s. sousae* Bocage of Angola, but lacking almost all trace of the rufous brown on the lower back which is so characteristic of that nominate race. Neither is there any dusky vermiculation there, or on the upper tail-coverts. The wings and tail are much less rufous, secondaries and wing-coverts being dark gray-brown, with only a narrow fringe of warm brown on their outer webs.

An adult female of this new race was also secured by Rudolf Grauer at Lake Burigi on June 8, 1907. It is not quite so grayish on the lower back as the male, but the wings and tail are similar. Furthermore, the rufous area on the posterior flanks, indicative of its sex, is markedly deeper in color and more extensive than in any female examined from Angola. The underparts of both examples seem whiter than in birds from Angola.

MEASUREMENTS: The male (type) has: wing-length, 86 mm.; tail, 89; culmen to base, 18.5; and tarsus, 23. Female: wing, 81 mm.; tail, 79; culmen to base, 17; and tarsus, 22. The outer primaries are in molt, so the wing-length of the female should probably be increased by about 3 mm.

Ten males from Angola have wings, 85-90 mm., and tails, 81-90. Twelve females from Angola have wings, 81-88 mm., and tails, 76-89.

RANGE: The northwestern part of Tanganyika Territory, from Lake Burigi and the upper Kagera Valley southward to the Uvinza district just east of Lake Tanganyika.

Mr. Moreau has kindly arranged for the British Museum to lend me the two specimens collected by him. The male agrees closely with the type of *L. s. burigi*, although its plumage is somewhat abraded, and has the wing 83 mm. long, tail 80 mm. The female is somewhat more brownish on crown and back than the female from Lake Burigi but shows no dark vermiculation on lower back or upper tail-coverts and has the same large rufous patch on the posterior flanks. The inner secondaries and greater wing-coverts show more extensive rufous edging and a little more dusky barring, but even this can scarcely be regarded as marking any transition to the nominate race. This female seems not to have been fully adult; its wing measures 83 mm., and its tail 81 mm.

There can be little doubt that the Uvinza birds are referable to the race *burigi* which may yet be found to extend farther south along the eastern side of Lake Tanganyika. However, the birds of Nyasaland seem not to belong to this new form. We have only one male in the American Museum, from Livingstonia, so more material should be examined from that colony and compared with skins from Angola.—JAMES P. CHAPIN, *American Museum of Natural History, New York.*

Starlings Catching Insects on the Wing.—A note by Raymond Cayouette (Auk, 64: 458, 1947) on the catching of insects on the wing by the European Starling, *Sturnus v. vulgaris*, has prompted me to bring together three observations I have on this odd feeding behavior. It should be understood that it is a common sight to see a starling "flycatching" from a perch, but unusual to see them flying in large circles for a long period of time and catching insects without returning to a perch.

On October 19, 1946, I saw a group of five birds flying in small circles catching insects which I thought to be box-elder bugs which were abundant at this time of the year. On the afternoon of October 4, 1947, at Credit Island, Scott County, Iowa, I saw about 30 birds of this species flying in circles 125 feet up in the air. One would circle in the air apparently until it saw an insect; it would fly up, catch the insect and circle again until another victim was sighted. They seemed to be quite expert at

this operation. On October 18, 1947, in the same area, I saw a pair going through this performance, but I was unable to determine what kind of prey they were securing. On November 2, 1947, in Scott County, a group of 20 migrants was seen at 1:00 p. m. "riding the wind" in the manner of the larger hawks. The majority of the birds were only 30 feet from the ground, but several were over 75 feet in the air. All were going through the flycatching maneuver.—JAMES HODGES, 3132 Fair Avenue, Davenport, Iowa.

Starling Catching Insects on the Wing.—With reference to the note by Raymond Cayouette (*Auk*, 64: 458, 1947) it seems worth pointing out that the habit of hawking insects on the wing with a somewhat swallow-like flight is a quite frequent and regular one of the starling, *Sturnus vulgaris*, in Europe, especially when flying ants are in the air. It is mentioned briefly by the present writer in 'The Handbook of British Birds' "... when hawking for high-flying insects adopts distinct wheeling and gliding action recalling swallow," and indeed must be familiar to most observers of birds on the British Isles. It would be interesting to know whether it is really as unusual in America as your correspondent's note suggests.—B. W. TUCKER, University Museum, Oxford, England.

Notes on the Breeding Behavior of the Bell's Vireo.—A pair of Bell's Vireos, *Vireo bellii bellii*, was discovered June 10, 1947, constructing a nest on the Robert Allerton Park of the University of Illinois, Piatt County, Illinois. Due to the excellent location and the early stage of nesting, a study of the birds was made, involving 12 hours of detailed observations at the nest.

The nesting territory of this pair of birds comprised 3.1 acres of grassland containing scattered trees and shrubs. The nest itself was situated in a blackberry patch, adjacent to a small intermittent stream, and bordered on the east by a small grove of 40-foot willow trees. The briar patch, some 50 feet in diameter, was located in a relatively undisturbed area of forest-edge. When discovered, the shape of the nest was barely discernible, poorly formed and somewhat lop-sided. The structure was suspended between the stalk and a leaf stem of a leaning briar plant 30 inches from the ground.

Both sexes engaged in nest-building. The female, however, worked faster and more energetically, with only occasional pauses for food. The male followed the female on many of her trips and often paused to sing. However, he brought a considerable share of the material and for short periods the birds alternated regularly in bringing materials and working them into the nest. The male appeared just as adept at handling nest material as the female, even to shaping the bowl by settling low in the structure and turning around and around. During one hour and ten minutes, the female made nine trips to the nest with material and the male six. Three times the male accompanied the female to the nest without material. The nest was completely built in four or possibly five days. Pitelka and Koestner (*Wilson Bull.*, 54: 97-106, 1942) stated, "the females apparently built the nests unaided," and Nice (*Condor*, 31: 13-20, 1929) said that the male may or may not assist in the nest-building. These observations substantiate the fact that the male helps to a considerable degree in nest construction.

The first egg was laid on the day following the completion of the nest. Egg number two was deposited during the morning of the second day, and steady incubation commenced with the laying of that egg. The clutch of four eggs was completed two days later.

Both sexes participated in incubation. The male appeared more "nervous" at

the nest and flushed much easier than did the female who permitted one to approach to within three or four feet of the nest before leaving. Incubation lasted 14 days from the laying of the second egg. The young were hatched during a two-day interval that elapsed between my visits. During three hours and twenty-six minutes of observation the male was recorded incubating the eggs for one hour and twenty-nine minutes while the female was on the nest for one hour and fifty-five minutes. The average periods of attentiveness were 17.8 minutes for the male and 23.0 minutes for the female. Inattentive periods for each sex were the reverse of the attentive periods, for the eggs were never left exposed, except for a few seconds during exchanges at the nest.

Observations showed that the male shared equally with the female in feeding and brooding the young. Two days after hatching, one of the young disappeared from the nest. During more than two and one-half hours in the middle of the day when the young were three days old, the male made 14 trips to the nest with food while the female made 11. The nestlings were fed, on the average, 9.2 times per hour. Most of the trips were more frequent than this, however, when the birds were actively feeding the young. During this same period, the male brooded the young a total of 25 minutes in four periods on the nest, as compared to the total of 51 minutes for the female in two periods.

The nestlings stayed in the nest for 12 days. On the first day after leaving, they were found about 30 feet from the nest. One had departed to the south, another due west, and the last toward the north. This may have been accidental but may, nevertheless, be better insurance of survival, since there would be less chance of the entire scattered brood becoming victims of a predator. Food was brought to them regularly by the female during an hour of observation. The male was neither seen nor heard during this time.

Five days later the three young birds were about 300 feet from the nest in the directions started but had moved closer together. The young birds had a distinctive call pattern which apparently was useful to the parent bird in locating them.—M. MAX HENSLEY, *Department of Zoology and Physiology, University of Illinois, Urbana, Illinois.*

A Record of the Black and White Warbler in Eastern Washington.—On August 15, 1948, a female Black and White Warbler, *Mniotilta varia*, was collected as it fed alone in willows bordering Paradise Creek, four miles east of Pullman, Washington. The specimen proved to be an adult with postnuptial moult only partially completed, thus giving it the rather worn appearance so characteristic of many of the warblers in late summer. The A. O. U. Check-List (1931) lists this species as accidental in Washington, but a search of the literature has failed to reveal the authority for this statement. The Distributional Check-List of the Birds of the State of Washington, Pacific Northwest Bird and Mammal Society, Northwest Fauna Series, No. 1, February, 1934, fails to mention the record, and there is no record for the state in the distribution files of the Fish and Wildlife Service. In view of this, it would seem that the above specimen represents the first definite record for the occurrence of the species in Washington State.—THOS. D. BURLEIGH, *Fish and Wildlife Service, Moscow, Idaho.*

Reverse Warbler Migration in the Connecticut Valley.—For several years, while watching September hawk-flights at Mt. Tom, in the Massachusetts part of the Connecticut Valley, observers have noticed reverse warbler (family Parulidae) migration which, though small in scale, is of regular occurrence. Singly and in small

groups, these birds have been seen from the Goat Peak and Bray towers, in Mt. Tom State Reservation, flying northeastward over and along that section of the Tom Range lying between Whiting Peak and Mt. Nonotuck. Hawks are the absorbing concern of observers on Mt. Tom during these weeks of September, and no serious study has been made of the occasional "chip birds" flying past, either low over the trees or at a moderate altitude above the ridge. A clear impression prevails in my mind that this diurnal northeastward warbler movement along the ridge is sufficiently regular to be the rule rather than the exception. I might add that it was being noticed long before the erection of two frequency modulation transmitters atop the southern, highest (1200 feet) end of Mt. Tom, about a mile south of the observation points.

In connection with such reverse migration, a letter from Allen Morgan, of Hartford, Connecticut, states in part the following: On September 19, 1948, we had a very heavy flight here in Hartford. Landbirds included White-eyed and Philadelphia vireos, eight plus Cape May Warblers, Connecticut Warbler, and Lincoln's Sparrow. Toward noon, four of us, including Mr. and Mrs. Leonard I. French and Doris Purinton, went up to Penwood Forest fire-tower on the Talcott Mountain ridge, eight miles northwest of Hartford, to try for hawks. By the time we arrived there high clouds were coming out of the northwest, but the light to brisk wind at our level was southeast. There was a heavy stream of warblers coming from the northwest across the north-south ridge past us and over the Connecticut Valley. Looking high over the latter we could see, with binoculars, countless individuals and small, loose flocks very high and moving due north on a southeast wind. The migrants seemed to be getting along well until they got into the valley where they flew aimlessly and finally took the course of least resistance—north up the valley, still flying high and obviously migrating. It is the first time I have ever seen such a landbird migration taking place. All the birds that came close enough for identification were warblers, and all appeared to be Blackpolls, *Dendroica striata*.

Mr. Morgan informs me, in a subsequent letter, that a frequency modulation transmitter on Talcott Mountain is about one mile south of the Penwood fire-tower.—AARON MOORE BAGG, 72 Fairfield Ave., Holyoke, Massachusetts.

Late Nesting of Kentucky Warbler in Washington, D. C. Area.—On June 13, 1944, a nest with four eggs of the Kentucky Warbler, *Oporornis Formosus*, was found by the writers on the grounds of the Agricultural Research Center at Beltsville, Maryland.

This nest was observed daily until hatching of the eggs occurred on June 20, seven days later. This nesting is the latest date (June 19) that unhatched eggs of this species have been observed in the District of Columbia area. The latest date previously recorded was June 15, 1879, as mentioned by M. T. Cooke in 'Birds of the Washington, D. C. Region' (Proc. Biol. Soc. Wash., 42: 59, 1929).—JOHN H. FALES, W. M. DAVIDSON, and C. C. HILL, Silver Spring, Maryland.

Connecticut Warbler at College Park, Maryland.—The Connecticut Warbler, *Oporornis agilis*, is a fairly common fall migrant in the area of College Park, Maryland, and Washington, D. C., reaching maximum abundance in late September and early October. However, as a spring migrant it is rare, choosing a different route of migration to its breeding ground.

Hampe and Kolb, 'Preliminary Report of the Birds of Maryland,' list this species as rare in spring in the Washington, D. C.-Baltimore area (including College Park). Likewise, Cooke, in her 'Birds of the Washington, D. C. Area' has only six records

of specimens taken during the spring migration. These records cover the period from about 1882 until 1911.

On May 19, 1948, on the campus of the University of Maryland, some seven miles from the District of Columbia, the writer procured a male. The bird was singing some four feet from the ground in heavy underbrush and appeared quite tame. In fact, it was more approachable than any other species in the vicinity. Most of the understory in this area was composed of spicebush, *Benzoïn aestivale*, and honeysuckle, *Lonicera* sp., with a macro-flora consisting mainly of sweet gum, red maple and red oak, *Quercus borealis* and *Quercus falcata*.

In the fall, the Connecticut Warbler is regularly seen at Laurel by Bruce Overington, and at Bowie by Robert Stewart and Chandler Robbins. A number are picked up at the base of the Washington Monument. One such specimen was found at the monument on September 30, 1947, by the writer.

One of the latest fall records listed in Miss Cooke's paper is a specimen secured in the region of the District of Columbia by William Palmer, October 24, 1889. Specimens obtained this late or later are certainly exceptions and probably due in some cases to unseasonable weather. It was this sort of unseasonable weather that prevailed in this area during the fall of 1948. November 6, with a temperature of 78° F., was the hottest day for this date in 77 years. The next day, November 7, still an unusually warm day, a male Connecticut Warbler was taken in a heavy growth of blueberries, *Vaccinium* sp., which composed the understory in a forest of scrub pine, *Pinus virginiana*, and oak, *Quercus* sp. This bird was followed at close range for a few minutes and seemed to prefer to remain near the ground in the blueberry bushes, flying up into the lower branches of the oaks when flushed, only to return to the bushes again when left alone.—BROOKE MEANLEY, *University of Maryland, College Park, Maryland.*

Correct Orthography for the Vernacular Name of *Oporornis tolmiei*.—For many years the common name of the well known western warbler *Oporornis tolmiei* has been incorrectly shown in our A. O. U. Check-list, and likewise, therefore, in our many works on ornithology.

John K. Townsend sent specimens of this bird, taken on his expedition to the Columbia River, to John James Audubon, who at first confused them with the eastern Mourning Warbler and figured them under that name. Townsend later demonstrated the differences to Audubon and supposed that the latter would call the western bird *Sylvia tolmiei*, this being the name that the discoverer proposed. Audubon, however, in volume 5, page 75, of his 'Ornithological Biography,' published in June, 1839, gave it the name "MACGILLIVRAYS WARBLER, *Sylvia Macgillivrayi*," remarking "thinking that I cannot do better than dedicate this pretty little bird to my excellent friend WILLIAM MACGILLIVRAY, Esq., I feel much pleasure in introducing it to the ornithological world, under a name which I trust will endure as long as the species itself." When subsequent writers changed Audubon's capital letters to ordinary type evidently there were no Scotsmen among them since the vernacular name was written "Macgillivray's Warbler," and in this form was introduced into the A. O. U. Check-list in the first edition in 1886. Audubon's hope for perpetuity has been only partly realized, since it was found subsequently that Townsend had published *Sylvia tolmiei* in the 'Journal of the Academy of Natural Sciences of Philadelphia,' volume 8, page 159, on April 16, 1839, thus antedating Audubon. Thus in the Third Edition of the Check-list in 1910 the scientific name became *Oporornis tolmiei*, though the common name remained unchanged.

The name of the well-known Scottish ornithologist, friend and assistant to Audu-

bon, was William MacGillivray, spelled with a capital G as here printed. Since the name was given in this form in the Twenty-third Supplement to the A. O. U. Checklist in the Auk for July, 1948, page 442, several friends have written me asking about this change in spelling so that it has seemed desirable to publish this note. Those who wish to look further into the matter may consult the interesting 'Life of William MacGillivray' by his namesake William MacGillivray, published in London in 1910. A plate facing page 68 in this work reproduces a hand-written letter from "W. MacGillivray" to Audubon introducing Mr. Bell, under date of 19th June 1834. This signature, in the writer's own hand, is clear, so that there is no uncertainty as to the method of spelling of the name.—ALEXANDER WETMORE, *Smithsonian Institution, Washington 25, D. C.*

An English Sparrow Roost.—While in a hospital at Marshalltown, Iowa, October 7 to 27, 1948, I had opportunity to make observations on a roost of English Sparrows, *Passer domesticus*, in Boston ivy on the walls. No matter how bright the day, the birds began to assemble in the vines at about 4:00 p. m. and by 4:10 every day their varied chatter attracted attention. The first thought that struck me was that the struggle for existence, at least as regards the search for food, could not be very severe or the birds would not give up an hour or more of potential feeding time for the sake of the social, and presumably not so vital, attractions of the roost.

While roosts of crows, swallows, starlings, and blackbirds are formed by birds already in flocks, this assemblage was of a different type. By twos or threes, but more often as singles, the sparrows came and joined in the apparently conversational chorus, meanwhile shifting about for desirable situations. The hubbub continued until dusk, at about 5:30 on clear, or earlier on cloudy, days. In the morning the chattering came quite regularly at 6:10 a. m., and all of the birds dispersed in about half an hour. A point of interest was that, through these three weeks, absolute time, not relative degree of daylight, seemed to rule, as the beginning of both assembling and dispersing was within a 10-minute range, regardless of whether the weather was cloudy or clear. The intensity of light at the "roost-breaking" was only a fraction of that prevailing during the "roost-formation"; hence it could not have been the decisive factor in stimulating both of these activities.

There was no mass movement either to or from the roost, so this gathering did not seem to be a flock phenomenon but rather a result of coincidence in the movements of numerous individuals seeking to satisfy similar wants.—W. L. McATEE, *Chicago, Illinois.*

Three Unusual Records from Louisiana and Mississippi.—On December 28, 1948, while driving on a country road about three miles east of Slaughter, East Feliciana Parish, Louisiana, I stopped my car and used the familiar "squeak" to bring up any birds in the vicinity. About three minutes after stopping, a Rose-breasted Grosbeak, *Phenicticus ludovicianus*, alighted on a blackberry briar about 15 feet away. I collected it; it proved to be a female. I am unable to find any reference to a previous winter record of the Rose-breasted Grosbeak, except a sight record reported by George H. Lowery, Jr. (Aud. Field Notes, 48th Christmas Bird Count, 1948: 100). This would, therefore, appear to be the first confirmed winter record of this species in the United States.

Howell in 'Birds of Alabama' (Alabama Dept. Game and Fisheries, 1928: 218) with reference to the Boat-tailed Grackle, *Cassidix mexicanus major*, says: "The boat-tailed grackle is a fairly common resident on the coast, but so far as known does not range into the interior." Oberholser, as well, in 'Bird Life of Louisiana' (Louisiana

Dept. Cons. Bull. 28: 599, 1938) states: "The Boat-tailed Grackle is an abundant permanent resident of the Gulf Coast region of southern Louisiana . . .", and he reports no record of it except in close proximity to salt water. On January 7, 1949, about two miles north of Anchor, Pointe Coupee Parish, Louisiana, while in company with Robert J. Newman, the Museum of Zoology, Louisiana State University, I shot a male Boat-tailed Grackle. The point at which this bird was taken is approximately 70 miles from the coastal marshes and it is the first time, as far as available records indicate, that this species has been reported at such a distance from that area.

While I was a resident of Vicksburg, Mississippi, from November, 1940, until April, 1948, I was never able to encounter the Ground Dove. Since I was afield on the average of once each week during that period, I came to the conclusion the bird was exceedingly rare in that area. On January 9, 1949, a male Eastern Ground Dove, *Columbigallina p. passerina*, was brought to me from my Vicksburg friend, Thomas Murphy, who had shot the bird that day on State Highway No. 3, at a point 22 miles northeast of Vicksburg, Warren County, Mississippi. Burleigh in 'The Bird Life of the Gulf Coast of Mississippi' (Occ. Pap. Mus. Zool., La. State Univ., No. 20: 386, 1944) states: "The presence of the Ground Dove as a transient in southern Mississippi was totally unexpected. So far as I am aware there are no actual breeding records for the State. Therefore the birds that appeared each fall in southern Mississippi must have come from the east, rather than from the north. Howell (1924) gives the status of this species in Alabama as 'a local and rather uncommon resident in the southern third of the State.' From personal experience I am of the opinion that this statement applies also to Georgia. Therefore, it is difficult to understand why a species considered resident within its range should appear with such regularity each fall on the Mississippi coast, and why there should be this tendency to migrate west rather than south into Florida. The fact remains, however, that each year the Ground Dove appears in October, and is seen at frequent intervals on the mainland and on the islands until the latter part of December. It apparently does not remain throughout the winter for I have no records for either January or February." In view of the foregoing, the Vicksburg record is interesting.

In each of the above three instances skins were made and the specimens turned over to the Museum of Zoology, Louisiana State University, at Baton Rouge.—MERRIAM L. MILES, 2350 Daytona Beach, Florida.

Date of John Abbot's Bird Plates in the De Renne Collection.—In 'The Auk' (35: 271-286, Pl. IV, 1918), Samuel N. Rhoads reported on a collection of Abbot's bird paintings in the De Renne Georgia Library near Savannah. From characteristics of the paper on which the pictures were drawn, Rhoads thought that they were "made several years prior to those described by Dr. Faxon" (Auk, 13: 204-215, 1896). The latter illustrations were labelled "largely in accord with the nomenclature of Wilson's 'Ornithology'" and one bore Abbot's signature and the date "1810". The volume in the De Renne collection containing Abbot bird paintings bore on the spine the legend, "Birds of Georgia, 1797." That this date is incorrect is clear from the artist's labelling which consists very largely of the vernacular and technical names of Wilson, which were not available until the period of publication of American Ornithology, 1808-1814. Such examples as the "Great Heron. *Ardea herodias*" and the "Wood Ibis. *Tantalus loculator*" agree with names in Volume VIII, 1814, of Wilson's work. The prevalence of Wilsonian nomenclature throughout the series indicates that the pictures were labelled, and thus probably made, after the several volumes of the American Ornithology were completed.—W. L. McATEE, Chicago, Illinois.

Some Bird Observations at Chevak, Alaska.—While on an expedition to western Alaska during the summer of 1946, I spent 17 hours in the field on June 20 and 21 in the vicinity of Chevak, about 22 miles east of Hooper Bay near the Bering Sea. Chevak is located at about 61.5° N. latitude and 167° W. longitude. This Eskimo village is located on the Kashunuk River along which we worked during the two days. The weather was cold, rainy and very windy. The country is typical tundra with a few small alders and willows. Through the moss I found: crowberry, *Empetrum nigrum*; Alaska tea, *Ledum decumbens*; alpine bearberry, *Arctostaphylos alpina*; and patches of cotton sedge, *Eriophorum*, as well as many other tundra plants.

The following numbers of birds was observed during the two days: Pacific loon, *Gavia arctica pacifica*, 8; whistling swan, *Cygnus columbianus*, 5; cackling goose, *Branta canadensis minima*, 103 (Three nests were found June 21, all within three meters of a lake. They contained three, five and six eggs); emperor goose, *Phylacte canagica*, 8 (A female was flushed June 21 from a down-lined nest with five eggs); white-fronted goose, *Anser albifrons*, 62 (Four nests were found June 20 on the tundra back from any lake, and another nest was found June 21—they contained four, four, three, two and six eggs, respectively); pintail, *Anas acuta tsitsihoo*, 30; green-winged teal, *Anas carolinense*, 2; greater scaup, *Aythya marila nearctica*, 3; old-squaw, *Clangula hyemalis*, 20; American scoter, *Oidemia nigra americana*, 24; Steller's eider, *Polystictia stelleri*, 3; Alaska ptarmigan, *Lagopus lagopus*, 11 (A nest found June 20 contained only two eggs; another found June 21 contained seven eggs); lesser sandhill crane, *Grus c. canadensis*, 17 (On June 20, an Eskimo named Mutchin showed me the plundered remains of two eggs from a nest he found June 16. We found another nest with two eggs on June 20 and another on June 21. Each was located on a small knoll in the tundra. The last two nests, slightly hollowed for the eggs, were constructed of a few grasses and sedges with a few willow twigs about five to 18 cm. long. Both nests measured 35.5 by 43.1 cm. The eggs in the second nest measured 93.5 by 55 mm. and 94.3 by 56.5 mm. Those in the third nest, 87.5 by 53.1 and 89.5 by 54.6 mm. The latter weighed 119.9 and 118.3 grams); golden plover, *Pluvialis dominica*, 2; black-bellied plover, *Squatarola squatarola*, 2; black turnstone, *Arenaria melanocephala*, 14 (On June 21, I found a nest with one egg nearly ready to hatch, two newly-hatched young and a third young which was dead. The latter bird weighed 12 grams); Wilson's snipe, *Capella g. delicata*, 2; red-backed sandpiper, *Erolia alpina pacifica*, 47 (A nest with four eggs was found June 20—they averaged 35.55 by 26 mm. in length and width and 10.8 grams [10.6 to 11.1] in weight); western sandpiper, *Ereunetes mauri*, 32 (A nest with four eggs was found June 21); Pacific godwit, *Limosa lapponica baueri*, 3; red phalarope, *Phalaropus fulicarius*, 4; northern phalarope, *Lobipes lobatus*, 8; parasitic jaeger, *Stercorarius parasiticus*, 7; long-tailed jaeger, *Stercorarius longicaudus*, 2; glaucous (?) gull, 8; short-billed gull, *Larus canus*, 24; Sabine's gull, *Xema sabini*, 26; yellow wagtail, *Motacilla flava*, 4; Savannah sparrow, *Passerculus sandwichensis*, 12 (A nest, found June 20, contained four young about two days old); longspur, *Calcarius lapponicus*, 12.—LAWRENCE H. WALKINSHAW, 1703 Central Tower, Battle Creek, Michigan.

Unusual Accidents of Birds.—My recent note (Auk, 65: 298, 1948) on the unusual death of a Red-winged Blackbird brought a letter from Mr. F. J. Freeman of Itasca, Illinois, who kindly gave me permission to publish one of his observations on an unusual avian accident. Mr. Freeman wrote that the caretaker of the Elk Grove Forest Preserve of Cook County, Illinois, in the winter of 1947, found a Screech Owl, *Otus asio*, caught in a tree crotch; it had apparently died from strangulation. I wish to add a recent observation of my own. A female Dickcissel, *Spiza*

americana, had a nest along Duck Creek, Scott County, Iowa. All Dickcissels in the area had been using electric wires as perches. On July 30, 1948, I found this female that had perched on one of a group of a dozen small wires that had been interlaced; her left foot had been caught between two of these small wires in such a manner that the bird was unable to free itself. Thus, she died of starvation. Even though in a lifetime an active field observer may see few such unusual examples of fatal accidents, they are probably quite common.—JAMES HODGES, Davenport, Iowa.

Birds Recorded from Greenland in 1776.—Greenland records, in most cases indicated by the citing of Eskimo names, given by Otho Frideric Muller, in his 'Zoologicae Danicae Prodomus' (Copenhagen, 1776), are tabulated below in the original and in up-to-date nomenclature. Those accompanied by question marks in the paper cited have been omitted.

NOTED AS SUPPLIED BY OTHO FABRICIUS

<i>Falco islandus albus</i>	p. viii	<i>Falco rusticolus obsoletus</i>
<i>Falco islandus fuscus</i>	p. viii	<i>Falco rusticolus obsoletus</i>
<i>Larus candidus</i>	p. viii	<i>Larus leucopterus</i>
<i>Fringilla lapponica</i>	p. viii	<i>Calcarius lapponicus lapponicus</i>
<i>Parus bicolor</i>	p. ix	<i>Parus bicolor</i>

COMPILED FROM THE SECTION "AVES" (PP. 9-34)

<i>Anas spectabilis</i>	p. 13	<i>Somateria spectabilis</i>
<i>Anas mollissima</i>	p. 14	<i>Somateria mollissima borealis</i>
<i>Anas hiemalis</i>	p. 15	<i>Clangula hiemalis</i>
<i>Alca arctica</i>	p. 17	<i>Fratercula arctica arctica</i>
<i>Procellaria glacialis</i>	p. 17	<i>Fulmarus glacialis glacialis</i>
<i>Procellaria pelecanus</i>	p. 18	<i>Phalacrocorax carbo carbo</i>
<i>Colymbus gryllus</i>	p. 18	<i>Cephus grylle grylle</i>
<i>Colymbus troile</i>	p. 19	<i>Uria aalge aalge</i>
<i>Colymbus immer</i>	p. 19	<i>Gavia immer immer</i>
<i>Larus tridactylus</i>	p. 20	<i>Rissa tridactyla tridactyla</i>
<i>Larus canus</i>	p. 20	<i>Larus canus canus</i>
<i>Larus marinus</i>	p. 20	<i>Larus marinus</i>
<i>Larus parasiticus</i>	p. 21	<i>Stercorarius parasiticus</i>
<i>Sterna hirundo</i>	p. 21	<i>Sterna hirundo hirundo</i>
<i>Tetrao lagopus</i>	p. 28	<i>Lagopus lagopus albus</i>
<i>Emberiza nivalis</i>	p. 31	<i>Plectrophenax nivalis nivalis</i>

The record of *Parus bicolor* which was also included by Otho Fabricius in his 'Fauna Groenlandica' (1780: 123) has not received Check-list recognition and *Larus c. canus* has been added recently (Suppl. 22, Auk, 1947: 448) on the basis of notes published by Hørring and Salomonsen in 1941 (Meddel. om Grøn., 131: 46-47, 1941).—W. L. MCATEE, Chicago, Illinois.

Records from the Del-Mar-Va Peninsula.—During the past several years considerable time has been spent on the study of the birds of the Del-Mar-Va Peninsula. This peninsula consists of the State of Delaware, several counties of Maryland, and two counties of Virginia, lying between the Chesapeake Bay on the west and the Delaware River, Delaware Bay, and the Atlantic Ocean on the east. Assateague Island, on which several of these records were noted, is a breaker strip of beach

extending from Ocean City, Maryland, south for about 40 miles to Chincoteague Inlet, Virginia. The southern third of this island lies in Virginia. In the course of these studies many records have been obtained, some of which are new for the area. Others will serve to give additional information on the distribution of certain species. Some of the more interesting records are in the following list.

SOOTY SHEARWATER, *Puffinus griseus*.—On June 21, 1940, an adult male was found in the channel at Chincoteague, Virginia. This is the second record for the peninsula.

GOLDEN EAGLE, *Aquila chrysaëtos*.—An immature bird was observed in flight over Assateague Island, Worcester County, Maryland, on February 11, 1949. This is the first observation of this species on the coast of Maryland.

BELTED PIPING PLOVER, *Charadrius melodus circumcincta*.—An adult male was collected on Assateague Island, Worcester County, Maryland, on March 12, 1949. This bird was associated with another of the same race and two Eastern Piping Plovers, *Charadrius m. melodus*; it represents the first recorded occurrence of this race in Maryland.

BUFF-BREASTED SANDPIPER, *Tryngites subruficollis*.—An adult female was collected on Assateague Island, Accomac County, Virginia, on September 5, 1948. This is the second record for Virginia.

GLAUCOUS GULL, *Larus hyperboreus*.—On May 6, 1949, an adult was observed at Ocean City Inlet, Worcester County, Maryland. It was observed for at least 45 minutes through a 35-power telescope, at a distance of approximately 200 yards. This bird was associated with a flock of several hundred Herring Gulls, *Larus argentatus*. These gulls were in plumages ranging from fully adult to birds hatched last spring. The almost pure white of this gull was conspicuous to the unaided eye. This bird was seen in many positions, sitting, walking, standing, running, flying, and preening. While trying to collect this bird, I managed to get within 100 yards of it several times and, consequently, got an excellent view of the unmarked wing-tips. Two other competent observers who saw and identified this gull are Chandler S. Robbins and Irston R. Barnes. This is the second record for the peninsula.

BRITISH LESSER BLACK-BACKED GULL, *Larus fuscus graellsii*.—An adult female was collected on Assateague Island, Worcester County, Maryland, on October 7, 1948. This bird was associated with approximately 250 Herring Gulls, *Larus argentatus*, and Ring-billed Gulls, *Larus delawarensis*. In size, this specimen approximates the Herring Gull. However, the dark mantle and yellow legs are very conspicuous. This bird was first seen in Virginia, when it flushed off the beach with the other gulls. It flew for about a mile and then settled back onto the beach in Maryland, where it was collected. The skin was sent to Dr. John W. Aldrich who identified it as to race. This is the first specimen for North America, the Greenland record having been discredited.

ATLANTIC KITTIWAKE, *Rissa tridactyla tridactyla*.—On January 8, 1937, an adult female was collected at Indian River Inlet, Sussex County, Delaware. This was the only individual observed and is the only recorded occurrence of the species in Delaware.

RAZOR-BILLED AUK, *Alca torda*.—On November 19, 1948, three auks were observed approximately 10 miles south of Chincoteague, Virginia. An adult female and an immature male were collected. This is the third record for the peninsula.

SAW-WHET OWL, *Cryptoglaux acadica acadica*.—In view of the small number of records for this owl in the state of Delaware, the following specimens seem worthy of mention: one taken near Magnolia, January 17, 1932; one near Millsboro, February 7,

1947; one near Stockley, December 25, 1948; and one near Georgetown, December 25, 1948. All the birds were picked up along the main road and had evidently been killed by cars.

CHUCK-WILL'S-WIDOW, *Caprimulgus carolinensis*.—An adult male was picked up in Milford, Delaware, on June 13, 1936. This is the first specimen from the state.

BICKNELL'S THRUSH, *Hylocichla minima minima*.—An adult female of this race, which was collected near Ellendale, Sussex County, Delaware, is the first recorded specimen for the state.

PINE GROSBEEK, *Pinicola enucleator leucura*.—An immature male was picked up on Assateague Island, Worcester County, Maryland, on November 16, 1945. This bird was in a very emaciated condition and died soon after capture. It is the first specimen for Maryland.

HOARY REDPOLL, *Acanthis hornemanni exilis*.—An adult male was collected at South Point, Worcester County, Maryland, on February 20, 1949. It was associated with a flock of about 30 Goldfinches, *Spinus tristis*, and was first noticed by Fred M. Packard. The skin was identified by Dr. John W. Aldrich and Ludlow Griscom and is the first to be secured south of New York City.—JOHN H. BUCKALEW, *Chincoleague National Wildlife Refuge, P. O. Box 62, Chincoleague, Virginia*.

Notes on Some Winter Birds of North Central New Mexico.—The observations recorded below were made in Santa Fe, Sandoval and Rio Arriba counties during the winter of 1939–1940. Occasional specimens, 54 in all, collected for racial identification, are deposited in the Museum of Zoology, University of Michigan.

Mr. Allen died in New Guinea in October, 1943, while serving with the United States Army. This manuscript was found in his files. Space limitations have necessitated including only the more important records. Dr. John W. Aldrich has brought the nomenclature to date and has made subspecific identifications of the Crow, Kinglet, Shrike, Montana Juncos and Pink-sided Juncos. Allen's specimens of these birds were borrowed through the courtesy of Dr. J. Van Tyne.

MOGOLLON CROW, *Corvus brachyrhynchos hargravei*.—A single crow of this subspecies was taken from a flock near Pojuaque on February 24. (This specimen has a very long wing and tail. It is equal in these measurements to the average *C. b. brachyrhynchos*. Its bill, however, is small and similar to that of *C. b. hesperis*. These characters are exactly those ascribed to the race *hargravei* by Phillips (Auk, 1942: 574). The validity of *hargravei* is further established by the measurements of Arizona and New Mexico specimens in the U. S. National Museum. In six females from that area the wing length ranges from 303 to 324 (average, 315.8 mm.) as against 282 to 313 (average, 299.6 mm.) for crows from northwestern regions which presumably are all referable to the race *hesperis*.—John W. Aldrich.)

CANON WREN, *Catherpes mexicanus conspersus*.—A Canon Wren was seen along Abiquiu Creek about five miles above the town of Abiquiu on January 8. A male was collected at almost the same spot on January 24.

ARIZONA GOLDEN-CROWNED KINGLET, *Regulus satrapa apache*.—Several flocks of kinglets were seen along Abiquiu Creek during January. A male was collected in this locality on February 15.

WHITE-RUMPED SHRIKE, *Lanius ludovicianus excubitorides*.—A number of these shrikes wintered in the Rio Grande Valley between Espanola and Velarde. A female was collected about a mile south of Velarde on December 28.

MONTANA JUNCO, *Junco oreganus montanus*.—Juncos are among the most common winter birds in the region around Santa Fe, but because of the difficulty of making field identifications of the different juncos it is hard to gain a good idea of their

relative abundance. The Montana Junco seems to be common in the lower altitudes. I have two specimens, a female taken January 8 at Abiquiu and a male taken December 26 at Velarde.

PINK-SIDED JUNCO, *Junco oreganus mearnsi*.—Three specimens were collected: a male at Abiquiu, January 8; a female near Abiquiu, January 24; and a male from foothills of the Sangre de Cristo Mountains, about six miles east of Santa Fe.

GRAY-HEADED JUNCO, *Junco c. caniceps*.—This is probably the most common junco in the region. Two were collected and many others were seen.

GAMBEL'S SPARROW, *Zonotrichia leucophrys gambelii*.—A female of this race was taken on January 7 at San Ildefonso. Another was seen there on January 16.

MOUNTAIN SONG SPARROW, *Melospiza melodia montana*.—A number of Mountain Song Sparrows wintered in the Rio Grande Valley around Espanola, and others were seen in the Chama Valley around Abiquiu. A male was taken January 8 near Abiquiu, and a female on December 28 near Velarde.—ROBERT WARD ALLEN, U. S. Fish and Wildlife Service, Laurel, Maryland.

Changes in Status of Connecticut Birds.—Observations for the past 35 years in southwestern Connecticut have brought out the following facts, some of which are either permanent or temporary changes in status of the species concerned.

PIED-BILLED GREBE, *Podilymbus podiceps*.—From 1934 to 1939, this species, formerly only a transient, became a summer resident in several suitable localities and probably bred here. In 1940, it returned to its status as a transient and has remained such since. When a summer resident the bird uses its long call, and its presence can be determined even when the bird is not seen. When a transient it is, in my experience, silent. It occurs as a transient mainly in March and April, but as a summer resident it was present in late May and June. No definite evidence of breeding was discovered.

BROWN PELICAN, *Pelecanus occidentalis*.—On June 12, 1939, five Brown Pelicans flew across the base of the Penfield Reef, Fairfield Beach, and on up the coast to the northeast. For a very short time they were directly in front of me, and readily observed in the light of the morning sun.

CLAPPER RAIL, *Rallus longirostris*.—This bird was formerly a rather rare summer resident of salt marshes in this region. About 1931 a slight increase was noted, and this increase continued until by 1944 the species was exceedingly common in suitable localities. Since then it has decreased somewhat, but it is still commoner than in former years. In the earlier years I found it only at Great Marsh, in the towns of Norwalk and Westport; in 1935 it appeared in the marshes back of Fairfield Beach. In early years I recorded the species only once or twice a year, but as the birds increased the records did also, till there were 22 in 1944. Formerly, I usually heard but one bird calling, later I often heard four to six from one spot.

On May 20, 1944, Elting Arnold and I found a nest containing nine eggs. When this nest was revisited on May 27, the number of eggs had increased to 11. All previously published nesting dates for Connecticut were in June. Several winter occurrences were reported by Gilbert Waldbauer, in 1945-46, and I saw one bird February 27, 1947.

PURPLE SANDPIPER, *Erolia maritima*.—The Penfield Reef extends about one and one-fourth miles into the sound from Fairfield Beach, is entirely covered at high tide, and is entirely exposed at low tide. Purple Sandpipers occur at the outer end of this reef but were unknown to me there until December 24, 1936, when I found a single bird. After this there was an increase, the birds occurring from October to May, in flocks numbering from five to 35. The earliest "normal" date was October 9, 1943,

and the latest was May 28, 1944. A single bird was seen by Joseph Brauner and myself on August 21, 1940. The birds decreased after 1944 and were last seen on February 9, 1946.

GLAUCOUS GULL, *Larus hyperboreus*.—This species was not listed in the 'Birds of Connecticut,' but a sight record by Herbert K. Job has been reported since (Bishop, Auk, 38: 582-589, 1921). In December, 1935, Mr. Arthur Knapp found an immature bird of this species at Seaside Park, Bridgeport. The bird remained in the vicinity until at least January 12, 1936. It was seen by a number of observers, including myself. I succeeded in taking several photographs of it; thus, though no specimen of this species has yet been taken in Connecticut, there is a photographic record. This species is reported regularly about New York City. Its greater rarity in Connecticut is accounted for by the fact that Long Island Sound is not the Atlantic Ocean.

PUFFIN, *Fratercula arctica*.—On November 19, 1947, a hunter shot an immature Puffin on the Penfield Reef. It was taken from him by a game warden and given to Mr. Frank Novak, warden of Birdcraft Sanctuary. The bird is now mounted in the sanctuary collection and appears to be the first record of the species for Connecticut.

EASTERN PHOEBE, *Sayornis phoebe*.—A phoebe spent the winter of 1936-37 in Fairfield. I observed it on several dates in every month from December 6, 1936, to March 6, 1937. A previous case of wintering of a phoebe at New Haven in 1905-06 is on record (Sage and Bishop, 1913: 102), and there are several other winter records. It is interesting to note that the type of locality was the same in all cases—an area where a wooded slope bordered on a marsh and springs along the borderline kept the water open all winter.

HORNED LARK, *Eremophila alpestris*.—This bird formerly occurred only as a transient or in winter and was never very common. In recent years it has become a summer resident in certain localities. A pair was seen May 2 and 3, 1938, at Compo Beach, Westport; the male was singing. In 1941, I found it under similar conditions in areas back of Fairfield Beach, and others reported it from Seaside Park, Bridgeport. Since then it has occurred in these localities every spring and summer month. No nest has been found, but adults were observed feeding birds in juvenal plumage on July 30 and August 4, 1945. I believe that this bird sings only where it breeds, and then only before or between nestings.

TUFTED TITMOUSE, *Parus bicolor*.—Previous to 1934, there were only five records of this species in Connecticut (Sage and Bishop, Bull. Conn. State Geol. and Nat. Hist. Survey, 20: 174, 1913, and Saunders, Auk, 35: 343, 1918). The increase of this species is perhaps best expressed by the dates on which I have observed it. These are: December 28, 1934; April 14, 1935; March 13 and June 8, 1943; November 1, 1945; May 20, 1946; July 21, 31, and August 2, 25, 1947; April 11, 1948, and April 18, 1949. Except for the last record, all these were single birds, never twice in the same location. In the last case there were two birds about half a mile apart. In all instances the birds seem to wander around without a mate, and no evidence of breeding has been noted.

SHORT-BILLED MARSH WREN, *Cistothorus p. stellaris*.—This bird is usually rare in this region, but in the summers of 1941 and 1942 they appeared in considerable numbers in late July and remained until September. They sang most of this time. In 1941 the first bird was seen and heard July 26, and more appeared in the days following until August 9 when from one spot I heard seven birds in song. They sang till September 2, and individuals were seen till September 20. In 1942, two birds appeared July 17, and on July 29 ten were heard singing; they sang until September

7. In 1943 a few birds were seen, but the song was heard only once—on August 5. Since then they have again become a great rarity. In none of these years was this species seen in the spring.

The area where they occurred was once a salt marsh but had been drained by the Federal Government; the original short grasses, *Spartina* and *Distichlis*, had been replaced by the much taller switch grass, *Panicum virgatum*.

BLUE-GRAY GNATCATCHER, *Poliophtila caerulea*.—This species has been gradually increasing for some time but, in the spring migration in 1947, it suddenly became common. On May 17 of that year, Paul Baker found a pair of the birds gathering silk of the tent caterpillar and carrying it to the limb of a swamp white-oak tree, about 20 feet above the ground. He showed me the completed nest on May 24. The birds were not around it but were in the tree-tops not far away. On May 28 a bird was on the nest, evidently incubating, but on May 30 the nest was broken and deserted. We searched in vain for a second attempt at nesting, but saw nothing more of the birds until August 19, when one bird was seen near the original nest site.

PROTHONOTARY WARBLER, *Protonotaria citrea*.—Records of this bird in Connecticut have been very few, as compared to other states that are even farther north. Paul Baker saw one bird in a swampy woodland in Fairfield in May, 1944. On April 29, I found one in the same locality; I knew nothing of Baker's find at the time. On May 5, 1945, Miss Esther Wagner found a second bird in this locality. The two birds, both males and distinguishable by slight differences in their songs, as well as by the territories they selected, remained in the locality at least until June 10, when their songs ceased and they could no longer be found. In 1946, the first bird appeared on May 11 and the second on May 22. The first bird remained until June 11, in the same locality as the year before but the second was found only till May 25. No female bird or nesting activities were noted. The birds have not been found since 1946.

CARDINAL, *Richmondia cardinalis*.—There has been a considerable increase in this species in the last few years. After the records in the winter of 1916-17 (Saunders, 1918: 342), single birds wintered in Fairfield in 1924-25, 1927-28, and 1940-41. A male in song on April 27, 1939, was the first appearance in the breeding season. In 1943 a pair appeared in Fairfield in March and evidently nested successfully, being seen with several young. The family remained through the next winter, and one of the young moulted to the adult male plumage. In 1944, there were Cardinals in many places. I found them in Norwalk, Westport and Fairfield, and they were reported by others in Stratford. Without especially looking for this bird I recorded it on 26 different days in 1944, and on 32 in 1945. Now the birds nest each year in the sanctuary in Fairfield, and probably many other places. While the bird is not abundant, it is by no means rare.

VESPER SPARROW, *Poocetes gramineus*.—This species has been recorded only a few times in winter in Connecticut (Sage and Bishop, 1913: 123). In the winter of 1936-37, a flock numbering at least 18 individuals remained for the winter. They were first seen December 27, 1936, and last seen on February 26, 1937, and on several intervening dates.—ARETAS A. SAUNDERS, *Fairfield, Connecticut*.

Additional Bird Records for Panamá.—During 14 months of military residence in the Panama Canal Zone, January, 1942, to February, 1943, inclusive, several species of interest were recorded by the writer. All of the North American species recorded below, except for the Surf-bird, are common in the eastern or southern United States and the writer has had frequent experience with them before and since.

DUCK HAWK, *Falco peregrinus anatum*.—Griscom (Bull. Mus. Comp. Zool., 78: 3,

1935) records this bird once in Veraguas and at Changuinola but does not mention any records for the Zone. Sturgis ('Field Book of Birds of Panama Canal Zone,' 1928) says, "Large falcons apparently of this species have been seen at several places in the Zone but especially at the Pacific canal entrance." I found this falcon to be common from October to February as follows: October 14, Fort Amador, one; October 21, Fort Davis, one; December 28, over Gatun Lake near Gatun, one; also from January 26 to February 22, 1943, at Fort Amador there were one or two seen daily.

GOLDEN PLOVER, *Pluvialis dominica*.—A new record for the Republic. On October 4, 1942, a flock of seven was seen on the parade grounds at Fort Clayton. These birds were leisurely studied at close range and the 'queedle' call was noted as they were put to flight to observe the wings and tail.

SURF-BIRD, *Aphriza virgata*.—Eisenmann (Auk, 65: 605-606, 1948) has published a record for August 14, 1947, for almost the identical locality of the present record. I saw a single bird on September 2, 1942, at San Francisco de la Galeta near Old Panamá. The bird was with Ruddy Turnstones which it resembles in shape and feeding habits.

BAIRD'S SANDPIPER, *Erolia bairdii*.—Griscom (*op. cit.*, p. 307), "Canal Zone on migration (once)." Found to be common in the fall of 1942, September 19 to October 28, on the rain pools in the grassy parade grounds of several Canal Zone army posts. The birds were in company with Least and Pectoral Sandpipers. All field marks were noted. Recorded as follows: Fort Amador, September 19 to October 1, from two to fifteen birds daily; Fort Clayton, October 14 to 18, less than ten, daily; Fort Davis (Caribbean Side) October 20 to 28, from one to ten daily.

SANDERLING, *Crocethia alba*.—Arbib (Auk, 52: 325, 1935) has the only previous record. It seems indeed strange that such a cosmopolitan bird should not be mentioned at all by either Griscom or Sturgis. I recorded it as follows: September 16, 1942, at Fort Amador, one; November 8, 1942, Palo Seco, C. Z. across the bay, one; and on November 17 and 18 at the mouth of the Río Chico (Panamá Province) there was a flock of five.

COMMON TERN, *Sterna hirundo*.—Griscom mentions two records for the Canal Zone but none for the Republic. The four following observations were made by the writer: June 15, 1942, a single at Fort Amador; July 31, 1942, at Río Hato (Coclé Province) no less than 30 birds; December 17, 1942, in Colon Harbor, several; and on December 29, 1942, on Gatun Lake near the locks a flock of nine.

CABOT'S TERN, *Thalasseus sandvichensis*.—Griscom (*op. cit.*, p. 309) mentions two records for Darién. I observed one bird on a small sandbar less than five yards offshore at Río Hato, Coclé Province. It was in company with the Common Terns on July 31, 1942.

BANK SWALLOW, *Riparia riparia*.—Griscom (*op. cit.*, p. 355) says, "A transient rarely recorded." Sturgis (*op. cit.*, p. 348) simply says it is a migrant. It was recorded by the writer once in the spring—four birds in a large flock of migrating Barn Swallows on April 17, 1942, between Frijoles, C. Z. and Barro Colorado Island. In the fall, the bird was recorded in large numbers from September 16 to October 28.

BLUE-WINGED WARBLER, *Vermivora pinus*.—New for the Canal Zone, although there is one previous record for the Republic by Griscom, (*op. cit.*, p. 366) for Port Antonio, Río Chepo, March 7, 1927, now in Coll. Havemeyer. On December 30, 1942, four of these birds were observed in a mixed flock of North American warblers at Caño Saddle, C. Z., on the northwest shore of Gatun Lake.

The following species are recorded by Griscom for the savannahs of western Pana-

ma east to the Canal Zone. These savannahs really extend almost 50 miles farther east to the Rio Chepo and these species were found common in this latter area.

1. AUDUBON'S CARACARA, *Polyborus cheriway audubonii*.
2. PANAMA PIPIT, *Anthus lutescens parvus*.
3. RED-BREASTED BLACKBIRD, *Leistes militaris*.
4. PANAMA MEADOWLARK, *Sturnella magna subulata*.

The following species apparently crossed the continental divide. They have been recorded only for the slope noted in parentheses. (It may be noted here that the low height of the continental divide, an important factor in locating the canal at this point, seems no barrier to many sea birds such as Man-o'-war Birds and Brown Pelicans.)

1. SCLATER'S WARBLER, *Basileuterus delatirii mesochrysus*.—(Pacific). At Camp Piña (10 to 15 miles southwest of Gatun) December 17, 1942, a single bird; Caño Saddle, C. Z., on Gatun Lake, two birds on December 30, 1942.
2. SHORT-LEGGED WOOD PEWEE, *Myiochanes brachytarsus*.—(Pacific). At La Verbena, C. Z., on October 20, 1942, one.
3. BLACK-TAILED MYIOBIUS, *Myiobius a. atricaudus*.—(Pacific, also Almirante). June 9, 1942, a single at Juan Mina, C. Z., on the Rio Chagres.
4. BODDAERT'S TANAGER, *Tachyphonus rufus*.—(Caribbean and the whole of Darién.) A female was seen December 27, 1942, at Chiva Chiva, C. Z.
5. YELLOW-BELLIED SEEDEATER, *Sporophila nigricollis*.—It was recorded as a summer immigrant only in the Canal Zone. A flock of 30 of these birds was seen, August 1, 1942, by the writer at Río Hato Air Base in Coclé Province 70 miles west of the Zone.—THOMAS A. IMHOF, 307 38th St., Fairfield, Alabama.

NOTES AND NEWS

THE Wilson Ornithological Club announces that applications for the 1950 Louis Agassiz Fuertes Research Grant of \$100 are being received by the Chairman of the Grant Committee, Dr. Charles G. Sibley, Department of Natural Sciences, San Jose State College, San Jose, Calif. Information may be obtained from the June, 1948, issue of 'The Wilson Bulletin.' Details and application blanks may be obtained from the Chairman.

DR. Eugene Eisenmann, 11 Broadway, New York 4, N. Y., is preparing an annotated list of the birds of Barro Colorado Island, Canal Zone. Information is wanted on seasonal status, nesting dates and distribution.

THE editors of 'Audubon Magazine' have long believed that professional and amateur ornithologists should write popularized accounts of their researches and of conservation problems to arouse greater interest and understanding among people outside the biological field. To stimulate more popular ornithological writing, 'Audubon Magazine' is now paying from \$15.00 to \$75.00 for all accepted articles ranging from 1,500 to 2,500 words, although shorter or longer material may be acceptable. Articles on bird ecology, migration, behavior and food habits, personal experiences in attracting birds, birds and other wildlife of a region, and local wildlife conservation projects are particularly desirable.—JOHN K. TERRES.

STUDENT MEMBERSHIP AWARDS FOR 1950 SELECTED BY THE A. O. U. COMMITTEE ON EDUCATION

Robert E. Bailey, Mus. Vert. Zoology, Univ. Calif., Berkeley 4, Calif.
Julian J. Baumel, Biol. Dept., Univ. Florida, Gainesville, Fla.

Gale Winslow Bennett, 42 Rich Street, Worcester 2, Mass.
Sumner Anderson Dow, Jr., 4601 Chapman Highway, Knoxville, Tenn.
Richard Rex Graber, 119 North Vine St., El Dorado, Kansas
William Bruce Jackson, 615 North Wolfe St., Baltimore 5, Maryland
Richard Fourness Johnston, 2223 Union St., Berkeley 4, Calif.
James William June, 204 Stillwell St., Laramie, Wyoming
William H. Kiel, Jr., 120 Ely Place, Madison 5, Wis.
Stuart Omar Landry, Jr., 2313 Haste St., Berkeley 4, Calif.
Joshua A. Lee, 2834 Sixth Ave., San Diego 3, Calif.
Andrew Hall Mac Pherson, 554 Driveway, Ottawa, Ontario, Canada
Bill F. Musgrove, 507 South Almon, Moscow, Idaho
David H. O'Neill, 114 Topliff Hall, Hanover, N. H.
Donald M. Petty, 632 East 8th N., Provo, Utah
Byron Arthur Schottelius, Box 545 C. S., Wash. State College, Pullman, Wash.
Wendell G. Swank, P. O. Box 4295, S. Station, College Station, Texas
Leslie A. Vierick, 206 Wheeler Hall, Hanover, N. H.
Robert Frank Winter, 4671 Harvey, Fresno, Calif.
Richard Laurence Zusi, 41 Salem Lane, Evanston, Ill.

PRESIDENT Robert Cushman Murphy has appointed the following Committee on Endowment for 1950: Elsie M. B. Naumburg (Chairman), Herbert W. Brandt, Jean Delacour, Francis H. Kortright, R. Allyn Moser, Herbert L. Stoddard.

THE Chicago Natural History Museum has just acquired the V. G. L. van Someren collection of some 17,000 East African birds. This collection, built up during Dr. van Someren's 40 years' work on East African birds, has representatives of most of the forms occurring in Kenya and Uganda, and some material from Abyssinia and from western Ruwenzori. Included in it are at least 37 type specimens. Hitherto the collection has been housed by Dr. van Someren in Kenya. This collection does not include all the material van Someren has collected, for a small collection of some 2,000 birds reported on in the *Ibis* (1916: 193) went to the Edinburgh Natural History Museum, and when van Someren published on his collection in *Novitates Zoologica* (29: 1-246, 1922; 37: 252-380, 1932) he deposited some 6,500 specimens in Lord Rothschild's Tring Museum, including all the types then in the collection. These are now in the Rothschild collection in the American Museum of Natural History in New York. Dr. van Someren has also retained a small representative collection at his residence in Ngong, Kenya.—A. L. RAND.

RECENT LITERATURE

The Birds of Concord. A Study in Population Trends.—GRISCOM, LUDLOW. (Harvard Univ. Press, Cambridge), pp. [12] + 340, 16 photos, and maps. June 30, 1949. Price, \$5.00.—This is by no means an ordinary book of the birds of a restricted area; it differs from the "usual treatment" in that trends in populations and the ecological factors behind them are stressed continually. Such a book would be impossible for most places. The Concord Region is unique in the United States in that it has been intensively used by man for about 300 years and has been studied, more or less intensively, by many ornithologists for the last century. Major ecological changes have taken place, and avian populations have varied. It is the purpose of the book to note and correlate these changes.

The mass of data that had to be reviewed for the book is astounding. The quantitative records date back to Thoreau (1832). William Brewster and the early members of the Nuttall Ornithological Club left nearly 100 volumes of records, lists, diaries and journals. More than 200 ornithologists have been active in the area for the last three or four decades. Mr. Griscom has sifted and evaluated these records at various intervals during some 13 years.

The introduction includes a description of the area, discussion of previous ornithological work and a statement of method. The remainder of the book is in two sections—population trends and species accounts.

The study of population trends is introduced by a summary of the environment provided by Concord during the century of study; this includes the geology, the climatic changes, the vegetational types, and the effect of man's activities. These ecological factors are then applied to specific avian examples. On pages 133 to 138 is a summary of the birds that have increased or decreased in numbers.

The numbers of birds are emphasized in the accounts of individual species and, where possible, year-to-year figures are given. Although this area has perhaps been studied more intensively, in quantitative fashion, and over a longer period of time than any other region of North America, the data presented show how woefully inadequate and incomparable is our numerical information. Yet, in many instances it is possible to note what seem to be long-time trends and sudden fluctuations.

Throughout the book an attempt has been made to apply general biological principles to birds. Many applications are admirably done in straightforward and simple fashion. However, in many instances the author seems to rely on broad, sweeping statements; in others, there is confusion and misuse of various terms. It would seem for example, that "biotic potential," rather than "reproductive capacity," was more important in the discussion on pages 77 to 80; the significant aspect of interest is the production of individuals and survival of these individuals to reproduce, not the sheer numbers produced in one year. Differential mortality and length of reproductive life must also be considered. The statement on page 91 that "Most North American birds if subjected even locally to the loss of 90 per cent of the *adult* population in one year would become extirpated for generations at the least, . . ." is questionable. It may apply to some birds, but it does not seem to apply to the Ruffed Grouse, as Edminster (1947: 317) quotes local losses of 75 to 90 per cent, and we simply do not know the situation with respect to many species. Sharp-tailed Grouse seem to fluctuate even more violently than do Ruffed Grouse.

What evidence is there that "seasoned adults" (p. 81) are absolutely necessary to the survival of a species? Cannot yearling birds, capable of reproducing, stave off extinction? I assume that "seasoned adults" are birds that have already passed

through one breeding period. In the discussion of annual mortality (p. 80) is the correct statement that for a population to remain static all that is necessary is that a pair of birds survive in good breeding condition and that they be on satisfactory breeding grounds.

Despite the fact that various workers frequently state that a species is not utilizing all available habitat or range, are we justified in saying (pp. 130-131) that that species has an "inadequate population," terming it an "unsuccessful" and even hazarding the opinion that "Here, as elsewhere, there might well be four times as many [Golden-winged Warblers]?"

Although I take exception to various other such generalizations, the book represents one of the first attempts to deal quantitatively with localized populations of birds over long periods of time. It is well written and is worthwhile, pleasant, and thought-provoking reading. The 16 excellent photographs from the library of the National Audubon Society are an added value, as is the complete indexing.—H. I. FISHER.

A Conservation Handbook.—Ordway, Samuel H. (Conservation Foundation, New York), pp. 1-76, 1949.—One hundred one concepts and terms commonly used in conservation practice are defined and described in simple elementary language. In addition there is a combination glossary and index. This little book may be useful to the uninitiated for understanding the jargon of conservation literature but is of little interest to the professional.—S. C. KENDEIGH.

The Inside Story of Binoculars. Choosing a Binocular.—Robert J. and Elsa Reichert. (Mirakel Repair Co., Mount Vernon, New York), pp. 1-12, 18 figs., 2 tables. Price, \$0.25.—This pamphlet consists of three articles full of factual, critical data on binoculars. Tests for efficiency, methods of selection, an evaluation of most makes (both foreign and domestic), and suggestions for maintenance are discussed.

Other articles by the same authors are:

1. Tests to Determine Quality of Binoculars. *Bird-Lore*, April, 1932.
2. Repairing of Binoculars. *Optical Journ.*, April 15, 1932.
3. The Use and Care of Binoculars. *Journ. Forestry*, July, 1935.
4. Choosing and Using Your Binoculars. *Nat. Mag.*, April, 1937.

It is believed that information in the above papers will be of importance to ornithologists in selecting and/or maintaining binoculars for highest efficiency.—H. I. FISHER.

Indian Hill Birds.—Ali, Salim. (Oxford Univ. Press, London, England.), pp. lii + 188, 72 plates, 64 in color. 1949. Price, Rupees 20.—This is an ambitious attempt to combine into a pocket-sized volume a brief enumeration of some 287 species of Indian birds which occur in the hills of that subcontinent. The magnitude of the task may perhaps be realized when the table on page xv is read, which lists 13 different hill regions, as far away from each other as the hills of Baluchistan and those of Ceylon, a distance of 2000 miles. Not only are these different hill regions remote, but a great variety of habitats occurs within them, ranging from north temperate or alpine to tropical rain forest. The task then is a difficult one, of far greater magnitude than that achieved by the author in his extremely popular 'The Book of Indian Birds.'

That Mr. Ali succeeds is due in large part to his many years of tramping about the Indian Hills, from his early days of residence near Dehra Dun, to his many trips for the Bombay Natural History Society Survey to Mysore, Travancore and the Central

Indian Hills, and to numerous side trips to Kashmir, Ladakh and Kailas. There are in truth few corners of the Indian Hills into which Salim Ali has not delved, and his name has become a byword among amateurs of birds in India.

The book is arranged with two comprehensive tables in the first part giving the distribution of the species, and then their characteristic recognition marks, tails, bills, crests, colors or whether largely white or pied, or the general effect brown or "sober." Following this is a detailed description of the species and their habits. For the complete amateur, I am not sure that the color guides are of any great significance. A bird seen in the jungle or other dark cover is virtually always "sober" in appearance, even though in reality it may be brightly colored. This is a difficult question for popular bird books which may perhaps never be solved to everyone's satisfaction.

Again, it is hard to include every species which might possibly be seen by the visitor or resident in the Indian Hills. One species which might well have been put in is the Purple Thrush, *Cochia purpurea*, often seen about gardens in the Darjeeling area. But space is a limiting factor in a book of this sort. From the point of view of a specialist, I am a little sorry that the author has not brought his scientific names more up to date. Numerous authoritative revisions of Asian birds have appeared in the last 15 years which might have been taken advantage of. Even if the author had been afraid of confusing the learned amateur trained in the school of Stuart Baker and his "Fauna" and so had hesitated to change scientific names listed in that outmoded work, it would have been possible to refer to a bird as "the such and such" of Stuart Baker. However, this is certainly not a matter of concern for the average reader.

Mr. G. M. Henry, who is at the very top of bird illustrators, has prepared 64 beautiful plates for this book, numbers of them of species not at all accessible in other illustrations. The originals which I have seen, of course, far surpass the printed plates which tend to err heavily on the side of reds and blues. By a clever stratagem he has succeeded in keeping the Red-billed Blue Magpie a decent size in his plate, rather than sacrificing the bird for the sake of its long tail. The photographs, principally by the author and Wan Tho Loke, are of first quality. This is an extremely useful and well-planned volume which should be possessed by all lovers of Indian birds.—S. DILLON RIPLEY.

Records of Parrot-like Birds Bred in the United States of America.—Prestwich, Arthur A. (A. A. Prestwich, Chelmsford Rd., Southgate, London), pp. 1-57, September, 1949. Price, \$2.00.—This booklet is a compilation of records from "Aviculture" and from Crandall's papers in 'Bulletin of the New York Zoological Society'; no other sources were searched. The various forms are discussed separately and one may find data on the number of eggs laid, longevity, fertility, hybridization and feeding.—H. I. FISHER.

Bird Life.—Armstrong, Edward A. (Lindsay Drummond Ltd., London), pp. ix + 152, col. frontis., 23 pls., 45 text-figs., October 28, 1949. Price, 12/6 net.—This book which emphasizes adaptations and relationships of birds to their environment might be termed a more advanced supplement to one of Armstrong's previous books—"The Way Birds Live"—which was designed for beginners.

In a very readable way the author discusses the rôle of heat, light, migration, territory, peck order, family care, recognition, coloration, voice, choice of nest sites and protective devices in the life of birds.

The photographs are excellent, but there is no index. Although one may take exception to such statements as that on page 15 regarding Cliff Swallows—"To such

efficient fliers an extra 2,000 miles is of little importance."—and the implication on page 127 that Woodcock intentionally carry their chicks between their legs, the material is concise and enjoyable in presentation and up to date in content. This is a good companion book to any field guide; beginners and others should be encouraged to learn some of the general principles of behavior, structure, ecology and distribution. There has been in our encouragement of beginners, too much emphasis on simple recognition and the getting of additional species on one's "life list."—H. I. FISHER.

The Awl-Birds.—Stanford, J. K. (Bevin-Adair Co., New York), 90 pp., 28 text-figs., December 7, 1949. Price \$2.00.—The return of the Avocet to England as a breeding bird after an absence of 123 years, inspired this adventure story based upon fact. The name "Awl-Bird" comes from the English countrymen because of the fancied resemblance of the bird's bill to a cobbler's awl.

The story deals with the nesting of three pairs of Avocets in the coastal marshes of an abandoned manor which has been purchased by a former army officer who knew the area as a child. His discovery of the birds and his jealous guardianship against egg collectors is an exciting ornithological story. In some respects it is reminiscent of the British film "The Tawny Pipit".

A happy collaboration is provided by the author's friend and illustrator, A. M. Hughes who served in the British Navy. An introduction by Helen G. Cruickshank points out the moral of the story as of equal application to many species of American birds.—FREDERICK C. LINCOLN.

Wildfowling in the Mississippi Valley.—Connett, Eugene V. (Editor). (D. Van Nostrand Co., New York), pp. xvi + 387, more than 200 photos, October 14, 1949. Price, \$12.00.—This is one of the Van Nostrand "Sporting Books"; it is designed to contain "the glowing story of the past," as regards the great number and slaughter of ducks and geese formerly in this region.

The initial chapter by F. C. Lincoln treats of the Mississippi Flyway as a biological entity. Cartwright's chapter on the breeding grounds contains brief descriptions of the area and presents recent numerical data on nesting density, band returns, and brood counts. The remainder of the book, except for the last three brief chapters (Research on Waterfowl, Duck Calling, and Making Hollow Wood Duck Decoys), is devoted to historical accounts, by province or state, written by various individuals acquainted with the locality concerned.

A typical chapter includes various and innumerable stories of "1000 duck kills" in one morning, of the activities of market hunters, of the origin of gun clubs, and of the sundry tricks employed by hunters to secure the most ducks. Information on conservation and the general pattern of distribution is to be found in some chapters.

As an historical story, each chapter is of significance. Individually, each chapter makes interesting and informative reading. However, there is great redundancy of material between the chapters. This, of course, does emphasize that ignorance of the principles of conservation was not limited to one region and that the problem is an international affair. It also serves to point up the need for intelligent management, including utilization, of our natural resources.—H. I. FISHER.

Bibliographie Ornithologique Francaise. 2 vols.—Ronsil, Rene. In *Encyclopedie Ornithologique*, (Paris), vols. 8 and 9. Vol. 1: 10 + 534; Vol. 2: 1-89. Volume 1 carries the date, 1948, and volume 2 has 1949 on title page; last page in each volume gives date of issue as April 29, 1949.—Volume 1 contains the actual bibliography of some 3,496 authors, listed in alphabetical order. There are citations of 11,607 articles in French and Latin and published between 1473 and 1944. All these titles are of publications dealing with birds in France and in the French Colonies.

Volume 2 is an index to volume 1. The first section lists the rather unusual abbreviations of journals, used in the first volume. In the second section, the index is by subjects such as food, anatomy, migration etc.; section three is a geographical index; four is an index to monographs; five indexes the taxonomic and historical papers; and six deals with applied ornithology.—H. I. FISHER.

Birds' Nests. A Field Guide.—Headstrom, Richard. (Ives Washburn, New York), pp. 1-128, 61 photos, September 14, 1949. Price, \$2.75.—The keys which form the body of this book have been used and built up over a period of several years; they were first published in part in 'The Bulletin of the Massachusetts Audubon Society.' The major headings of the key are based on the general ecological situation of the nest (that is, swamp, woods or field) and minor divisions are: broad aspect of location (ground, grass, tree etc.); immediate site (where in tree, bush); type of nest (open, closed); shape (cup, saucer, gourd, platform); attachment (suspension, saddle); size; depth; and materials used. When a nest is run through the keys to the species one finds an adequate description and a broad statement of the range of the species; these may be used to check the identification.

The photographs are an additional aid. Only species (more than 300) nesting in the United States and east of the 100th meridian are included.—H. I. FISHER.

Birds of Britain. A Guide to the Common Species.—Macdonald, J. D. (G. Bell and Sons, Ltd., London), pp. 1-153, many figs., 9 pls. (5 col. pls.). July 1, 1949. Price, 8s. 6d.—The organization of this book is based upon the sound thesis that, for beginners at least, recognition of birds by natural groups is of primary importance. However, these groups should be uniformly formulated on morphological, taxonomic or ecological bases. Arbitrary groupings give rise to unnatural combinations—the Sylviidae, Prunellidae and Troglodytidae as the "Warbler Group"; the dipper and kingfisher together. There may be good reasons for including the cuckoo and shrike in the "Hawks and Hawk-like Birds," but one wonders if such conglomerations will not be confusing as the novice learns more of the true relationships.

After 38 pages of characterization of these 20 groups, there are species accounts, arranged by the same groups, of some 200 of the common and common-to-rare birds of Britain which has an all-inclusive list of more than 400 species. Keys of field characters are provided for differentiating the species in each group. The species accounts are not uniform in content but contain information on size, field characters, habitat, seasonal status, a brief summary of distribution in Britain and some behavior traits; songs and notes are not accorded much attention. Juvenal plumages are not described, and in some instances of external sexual dimorphism the male and female are inadequately described.

The colored plates and wash plates are interesting and informative; the black and white sketches are not outstanding. The index consists solely of common names, although scientific names are present in the accounts, and there are no indices to the pertinent material in the descriptions by groups. The group discussions are cross-referenced to the species accounts, but the reverse referencing is absent.

Despite these possible short-comings which are perhaps of minor magnitude, the guide is well constructed. It should prove of value to those not acquainted with the birds of Britain.—H. I. FISHER.

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ALDRICH, JOHN W. AND OTHERS. 1949. Migration of some North American water-

- fowl. U. S. Dept. Int. Fish and Wildl. Serv., Spec. Sci. Rept., (Wildlife) No. 1: 47 pp., 32 maps, 1 table.
- ALEXANDER, H. G. 1949. Bearded Tits at Cley, Norfolk, and in Sussex. *Brit. Birds*, 42 (9): 289-290.
- ALLAN, PHILIP F. 1949. Black-chinned Hummingbird in Tarrant County, Texas. *Condor*, 51 (6): 271-272.
- ALLEN, CHARLES E. 1949. Observaciones de Parana. *Hornero*, 9 (1): 92-95, 2 photos.
- ALLEN, DURWARD L. 1949. Recent trends in farm wildlife management. *Trans. 14th N. A. Wildl. Conf.*, pp. 235-259.
- ALLIN, A. E. 1949. Fall records of the Golden Plover at the Canadian Lakehead. *Flicker*, 21 (2): 60-61.
- AMADON, DEAN. 1949. The seventy-five per cent rule for subspecies. *Condor*, 51 (6): 250-258, 1 fig., 2 tables.
- AMANN, FRITZ. 1949. Nest der Rabenkrähe [*Corvus corone*] auf einem Starkstrommast. *Orn. Beob.*, 46 (4): 124-125, 1 fig.
- AMANN, FRITZ. 1949. Halsbandfliegenschnäpper im Allschwilerwald bei Basel. *Orn. Beob.*, 46 (4): 129-130.
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- AMUNDSON, ROD. 1949. The Bobwhite Quail. *Wildl. in North Carolina*, 13 (8): 4-9, 7 figs.
- AMUNDSON, ROD. 1949. The Canada Goose. *Wildl. in North Carolina*, 13 (9): 4-7, 4 figs.
- AMUNDSON, ROD. 1949. The American Woodcock. *Wildl. in North Carolina*, 13 (10): 4-7, 21, 5 figs.
- ANDERSON, PAUL K. 1949. Birding in the Quabbin Reservation. *Bull. Mass. Aud. Soc.*, 33 (5): 177-179, 2 figs.
- ANONYMOUS. 1949. The Black-headed Grosbeak reported from Gilford, New Hampshire. *Bull. Maine Aud. Soc.*, 5 (4): 78-79.
- ANONYMOUS. 1949. [Tufted] Titmice mate in Connecticut. *Bull. Mass. Aud. Soc.*, 33 (6): 256.
- ANONYMOUS. 1949. Operation gobbler [turkey]. *Fla. Wildl.*, 3 (2): 10-13, 9 figs.
- ANONYMOUS. 1949. Plane herding saves swans from polluted food supply. *Id. Wildl. Rev.*, 2 (2): 6, 3 figs.
- ANONYMOUS. 1949. Swans switch states. *Id. Wildl. Rev.*, 2 (2): 7.
- ANONYMOUS. 1949. Government cracks down on illegal shooting of ducks. *Ky. Happy Hunting Ground*, 5 (5): 32.
- ANONYMOUS. 1949. A report on progress of the "adoption" method of Bob White Quail propagation. *Mo. Cons.*, 10 (7): 10.
- ANONYMOUS. 1949. "Bow-ties" [plastic wing markers] for Bobwhites. *Okl. Game and Fish News*, 5 (10): 6-7, 5 figs.
- ANONYMOUS. 1949. Hungarian Partridge eggs imported. *Ore. State Game Comm. Bull.*, 4 (9): 4, 2 figs.
- ANONYMOUS. 1949. Upland game populations—up or down? *Outdoor Ind.*, 16 (10): 10-11, 1 table, 1 fig., 1 map.
- ANONYMOUS. 1949. Rails of Virginia. *Va. Wildl.*, 10 (9): 18-19, 22, 4 figs.
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- ANONYMOUS. 1949. Erwin Stresemann 60 Jahre alt. *Vogelwelt*, **70** (5): 147-148, pl. 16.
- ANONYMOUS. 1949. Bird predators. Wash. State Game Comm. Bull., **1**: 4.
- ANONYMOUS. 1949. Chukar Partridge. Wash. State Game Comm. Bull., **1**: 6, 1 fig.
- ANONYMOUS. 1949. Waterfowl production. Wash. State Game Comm. Bull., **2**: 3, 6, 2 figs.
- ANONYMOUS. 1949. Conduct Wisconsin tests with European Grouse. Wis. Cons. Bull., **14** (10): 35, 1 fig.—Capercaillie and Black Grouse placed on island.
- ANONYMOUS. 1949. Chukar introduction. Wyo. Wild Life, **13** (7): 36.—1st Wyoming release in 1937.
- APPERT, OTTO. 1949. Weissberinger Kiebitz [*V. vanellus*] kehrt in seine Brutheimat zurück. Orn. Beob., **46** (4): 127-128.
- APPERT, O. 1949. Zwergtrappe im Wangner Ried. Orn. Beob., **46** (4): 131-132.
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OBITUARIES

GAYLE BENJAMIN PICKWELL, Member of the American Ornithologists' Union since 1938, died on May 29, 1949.

Born on March 25, 1899, in Murdock (Cass County), Nebraska, Pickwell received his early schooling in the public schools of Murdock and Elmwood, Nebraska. His A.B. and M.A. degrees were obtained from the University of Nebraska in 1921 and 1922. Work toward the Ph.D. degree, carried on at Northwestern University and in special summer study at Woods Hole, Massachusetts, was brought to completion at Cornell University in 1927. His thesis for the doctorate was a field study of the Prairie Horned Lark, published by the St. Louis Academy of Science in 1931.

From 1922 to 1926, Pickwell was an instructor in zoology at Northwestern University. In the fall of 1927 he joined the staff of the San Jose State College and rose to full professorship in 1930, a position which he held until his retirement in 1946.

In the winter of 1930 he became the victim of multiple sclerosis, the disease which

took his life some 19 years later. The greater part of his scientific career, therefore, was shadowed by illness. In spite of this, however, Dr. Pickwell distinguished himself as a teacher and a naturalist. His best known books include a series published by McGraw-Hill—Weather, Deserts, Animals in Action, and Birds. His latest work on Amphibians and Reptiles of the Pacific States, published by the Stanford University Press, has become a standard reference. He was also the author of numerous articles for scientific journals.

Well known for his work in nature photography, Dr. Pickwell prepared illustrations for 50 or more filmstrips dealing with ecology, weather, trees, flowers, insects, amphibians, reptiles, birds and mammals. Each filmstrip he accompanied by an explanatory leaflet.

Although his work in natural history covered a broad field, Dr. Pickwell's chief interest was in birds. In addition to his membership in the American Ornithologists' Union, he had been President of the Northern Division of the Cooper Ornithological Club. He was also a leader in the local Audubon Society of the Santa Clara Valley.

Following Dr. Pickwell's death, a number of his friends presented a substantial financial contribution to the Multiple Sclerosis Research Society of New York. This was given as a memorial to Dr. Pickwell who, throughout his own years of illness, had many times offered himself for experimentation with the hope of providing information of value in helping other sufferers from this disease.—HILDEGARDE HOWARD.

FRANCIS (FRANK) LA GRANGE FARLEY died in Camrose, Alberta, Canada, on October 22, 1949, in his 79th year. He was born at St. Thomas, Ontario, on February 24, 1870, a son of the late John Farley. Long identified with natural history interests, he became an Associate of the American Ornithologists' Union in 1946 and received the rank of full Member approximately two weeks before his death.

Early in his career Frank Farley became passionately devoted to birds. For many years his studies were conducted in Ontario. At the age of 22, in March, 1892, he arrived in Red Deer, then the end of steel between Calgary and Edmonton. Farley homesteaded in the district, retained his enthusiasm for ornithology, and rapidly developed into an outstanding field naturalist.

In 1907 he sold the farm and located in the new town of Camrose; there he continued to live for the remainder of his life. As the years went by he seized every opportunity to cover various parts of the province to gather data for a work on Albertan birds which, unfortunately, was not completed before his death. Frank published numerous notes and longer papers on birds of the province. The majority of these appeared in the 'Canadian Field-Naturalist.'

In due time Farley won wide recognition on the continent as a lover and student of birds and an ardent conservationist. In the best sense of the term he was a true pioneer in Alberta ornithology. His circle of friends was very extensive and his beneficial influence marked in relation to aspiring young students of wildlife. His vigorous and cheerful personality will remain a cherished memory. With Frank Farley's passing, another link with the pioneer days of Western Canada is irrevocably lost.—J. DEWEY SOPER.

VICTOR EMMONS JONES, professor of zoology at Idaho State College, Pocatello, Idaho, and an Associate of the A. O. U. since 1940, died at Salt Lake City, Utah, August 24, 1949.

He was born June 13, 1892, at LaPlata, Missouri. After graduating from the

University of Idaho in 1916, he filled various positions in zoology before joining Idaho State College 22 years ago.

A problem of particular interest to him was the nesting of the House Finch. He published the first record of the Starling for the state (Jones, Condor, 48: 142-143, 1946). The Victor E. Jones memorial has been created at the college to honor his memory.—JAMES H. PHELPS.

WILLIAM LLOYD BAILY, who was elected an Associate in 1886 and who became a Member in 1901, died at Haverford, Pennsylvania, April 6, 1947. He was born in Philadelphia on December 26, 1861. After graduation from Haverford in 1883, he followed the profession of architecture.

Interest in birds was constant since his college days. Beginning in 1900, he served for 45 years as Inspector of Birds and Mammals, Port of Philadelphia. He began photographing birds as early as 1895 and was particularly skillful in sketching them. A collection of approximately 800 bird skins made by him was given to the Philadelphia Academy of Sciences. His chief monument is the Delaware Valley Ornithological Club which he was instrumental in founding in 1890. Valuable papers were published in 'The Auk,' 'Cassinia,' and 'Bird-Lore'. His last important contribution was a list of 207 species of birds known to have occurred on the grounds of Haverford College (Haverford Review, 4: 31-4, 1945). He was buried in the Friends Southwestern Burial Grounds, Cardington, Pennsylvania. (For further information see article by W. J. Serrill, Cassinia, No. 37: 17-8, 1949.)—A. W. SCHORGER.

GEORGE WARE BARBER, American naturalist, educator and writer, and A. O. U. Associate since 1932, died in his 59th year in New York City, December 5, 1948. Descendant of an early New England family, he was born at Hyde Park, Massachusetts, August 3, 1890. He early manifested an interest in natural history, particularly in entomology and ornithology. He received the Bachelor of Science degree from Massachusetts Agriculture College in 1913, and the M.S. and Sc.D. degrees from Harvard in 1925 and 1927, respectively. He entered service of the United States Department of Agriculture, Bureau of Entomology on January 1, 1914, and retired at age 55 on November 15, 1945. After retirement from government service he became connected with Rutgers University in special work on toxicity of new insecticides, notably DDT, until his death. On July 28, 1919, Dr. Barber married Miss Estelle Hulse of Chattanooga, Tennessee, who, with their only child, George Winston survive him. In addition to the A. O. U., Dr. Barber's memberships or fellowships also included American Academy of Arts and Sciences, American Association for the Advancement of Science, Entomological Society of America, American Association of Economic Entomology, New York Entomological Society, Agriculture History Society, and others. Although deeply interested in ornithology, it was not always possible for Dr. Barber to find time from other duties for more than non-continuous field observations as opportunity offered, so his notes are of necessity somewhat fragmentary. His library, however, was rich in the more important contributions to ornithological literature.—J. S. WADE.

MORTON EVERETT CUMMINGS, an Associate since 1940, died at Reading, Massachusetts, April 20, 1949. He was born at Malone, New York, September 14, 1876. Graduation from Harvard University and its Medical School took place in 1898 and 1901, respectively. He was a member of the Nuttall Ornithological Club, National Audubon Society, and the Audubon societies of Massachusetts and Florida, and served as president of the Brookline Bird Club. In 1940, he travelled extensively in the United States and with the aid of local ornithologists compiled an impressive

list of 752 species of birds seen (Bull. Mass. Aud. Soc., 26: 5-9, 1942). His ashes were scattered on Concord River.—A. W. SCHORGER.

HAROLD TROWBRIDGE PULSIFER, an Associate since 1947, died at Sarasota, Florida, April 8, 1948. He was born at Manchester, Conn., November 18, 1886. In 1911, he graduated from Harvard University and was odist for his class. He became a member of the editorial staff of 'Outlook' in 1913, and served as editor from 1923 to 1928. His poems were a distinct contribution to literature. He was an ardent trout fisherman and served for many years as president of the Megantic (Maine) Fish and Game Club.—A. W. SCHORGER.

ROBERT FRANCIS CHENEY, an Associate of the American Ornithologists' Union from 1922, died June 3, 1949, at the hospital in Framingham, Massachusetts, where he had gone from his home in Southborough. He was born in Lee, Massachusetts, December 18, 1875, and was graduated in 1897 from Williams College, where he took the degree of M.A. in 1898. In 1901, he was graduated from the Episcopal Theological School in Cambridge. From 1910 to 1946 he was, first Vicar, then Rector, at Southborough, Massachusetts. There he was intimately associated with Saint Mark's School and the Pay School for younger boys, and he did much to foster an interest in birds and conservation among the boys. He was a Director of the Massachusetts Audubon Society, 1920-1948, and a member of the Nuttall Ornithological Club from 1933. As a stamp-collector he built up a valuable collection of postage stamps having pictures of birds, and his collection of stamps of the island of Lundy, with units of puffins instead of pence, was said to have been the largest in the world.—FRANCIS H. ALLEN.

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